

A Review and Reformulation of Social Information-Processing Mechanisms in Children's Social Adjustment

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Research on the relation between social information processing and social adjustment in childhood is reviewed and interpreted within the framework of a reformulated model of human performance and social exchange. This reformulation proves to assimilate almost all previous studies and is a useful heuristic device for organizing the field. The review suggests that overwhelming evidence supports the empirical relation between characteristic processing styles and children's social adjustment, with some aspects of processing (e.g., hostile attributional biases, intention cue detection accuracy, response access patterns, and evaluation of response outcomes) likely to be causal of behaviors that lead to social status and other aspects (e.g., perceived self-competence) likely to be responsive to peer status.

Children's social adjustment has been a popular topic of investigation in recent years. Concern about the quality of children's social relationships has been motivated in large part by longitudinal evidence suggesting a link between social adjustment in childhood and later life difficulties (see Parker & Asher, 1987, for a review). Recent efforts to understand children's social difficulties have demonstrated the utility of social-cognitive approaches to social adjustment. These investigations have typically been based on the premise that social cognitions are the mechanisms leading to social behaviors that, in turn, are the bases of social adjustment evaluations by others (e.g., Dodge, 1986; Ladd & Mize, 1983; Rubin & Krasnor, 1986). From this perspective, comparisons of the social cognitions of socially adjusted and maladjusted children are important because they shed light on particular cognitive styles or difficulties that may contribute to maladjustment.

The study of children's social cognition has a long history (for reviews, see Shantz, 1975a; 1983) and has been conducted by researchers working within diverse fields, including developmental psychology (e.g., Berndt & Berndt, 1975; Ladd, 1981), educational psychology (e.g., Asher & Wheeler, 1985), clinical psychology (e.g., Coie, 1990; Dodge, 1986; Furman & Bierman, 1983; Shantz, 1975b), and communication (e.g., Burleson, 1982). Not surprisingly, many different aspects of children's social cognition have been emphasized by various researchers working at different points in time. Initially, the methods and

theories used in studies of children's social-cognitive abilities were largely adapted from those used in studies of nonsocial cognitive development. This application resulted in examination of global cognitive constructs such as perspective taking, role taking, and referential communication (e.g., Flavell, Botkin, Fry, Wright, & Jarvis, 1968; Selman, 1971). However, the mixed findings often produced by studies of these global constructs (see Shantz, 1975a; 1983) and the introduction and growing popularity of information-processing theories (e.g., Newell & Simon, 1972) have led to major changes in empirical and theoretical approaches to the study of social cognition in children. One important change has been a focus on more specific components of "on-line" cognition than those examined in earlier work (Dodge & Feldman, 1990). Consequently, researchers interested in children's social adjustment have begun to speculate about the individual cognitive tasks that might be involved when a child is engaged in social interaction.

In recent years, social information-processing models of children's social behavior have emerged that have provided significant advances in the understanding of children's social adjustment (e.g., Dodge, 1985, 1986; Dodge & Crick, 1990; Dodge, Pettit, McClaskey, & Brown, 1986; Heusmann, 1988; Ladd & Crick, 1989; Rubin & Krasnor, 1986; Slaby & Guerra, 1988; Yeates & Selman, 1989). In one version of this model (Dodge, 1986), it is proposed that children, when faced with a social situational cue, engage in four mental steps before enacting competent social behaviors (see Figure 1): (a) encoding of situational cues, (b) representation and interpretation of those cues, (c) mental search for possible responses to the situation, and (d) selection of a response. During Steps 1 and 2, encoding and interpretation of social cues, it is hypothesized that children focus on and encode particular cues in the situation and then, on the basis of those cues, construct an interpretation of the situation (e.g., an inference about the intent of a peer with whom the child is interacting). During Steps 3 and 4, it is proposed that children access possible responses to the situation from long-term memory, evaluate those responses, and then select the most favorable one for enactment.

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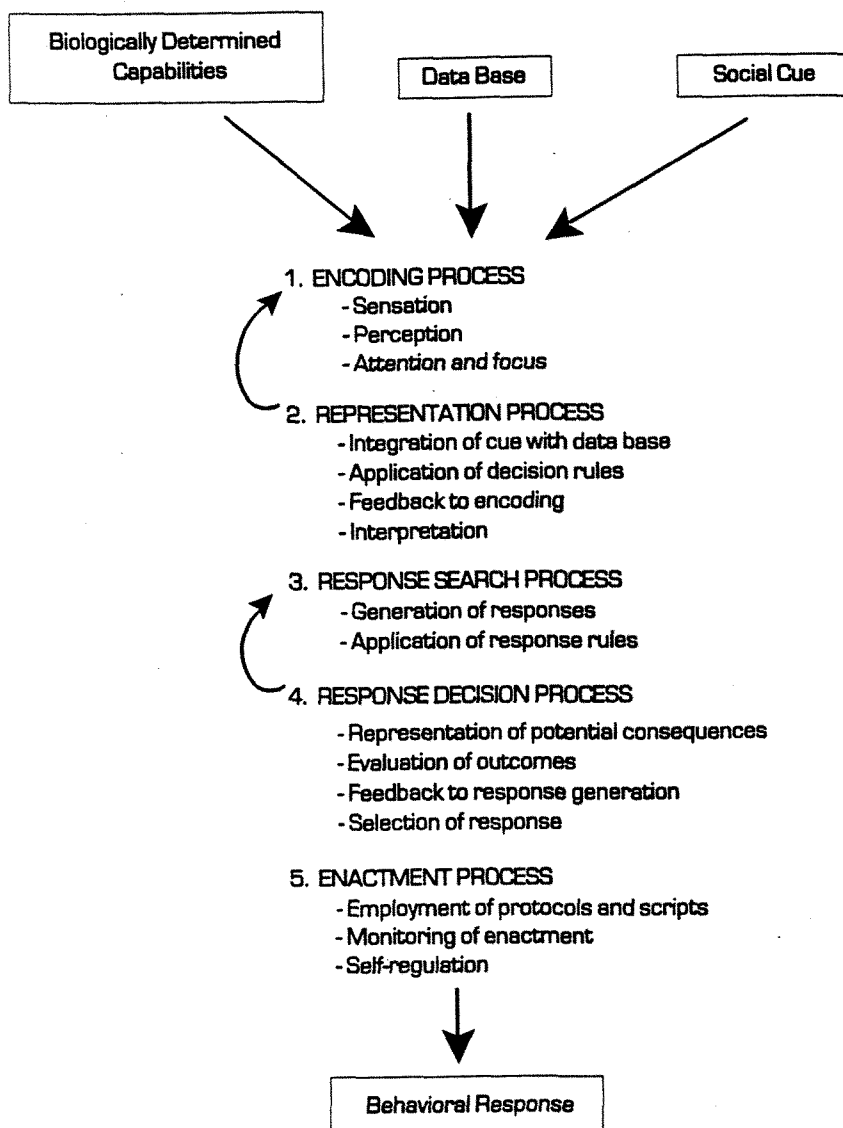


Figure 1. A social information-processing model of children's social adjustment. From "A Social Information Processing Model of Social Competence in Children (p. 84) by K. A. Dodge, 1986, in M. Perlmutter *The Minnesota Symposium on Child Psychology* (Vol. 18). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc. Copyright 1986 by Lawrence Erlbaum Associates, Inc. Reprinted by permission.

The specific processing components that are proposed in this model have been more successful in predicting children's social adjustment than the global constructs used in prior work. In addition, this model has served an organizational function by describing linkages among several aspects of social information processing. This has led to the assessment of several social information-processing variables in a single study and correspondent increases in predictive power (e.g., Dodge et al., 1986). It also has encouraged investigation of the ways in which two or more processing steps work together to influence social behavior (e.g., Dodge & Somberg, 1987). And, finally, because the model describes specific processes that can be taught to children, it has served as an important guide for those engaged in

intervention with socially maladjusted children (e.g., Conduct Problems Prevention Research Group, 1992).

The first goal of the present article is to provide a critical evaluation of the current state of this model and a revision that reflects recent conceptual and empirical innovations in the areas of developmental psychology, clinical psychology, cognitive science, and other related fields. It is our hope that this reformulated model will have improved potential for contributing significantly to the understanding of children's social adjustment. Our second goal is to provide a review and critical assessment of the current state of research in the area. Finally, the third goal is to suggest issues that may benefit from future empirical and theoretical attention.

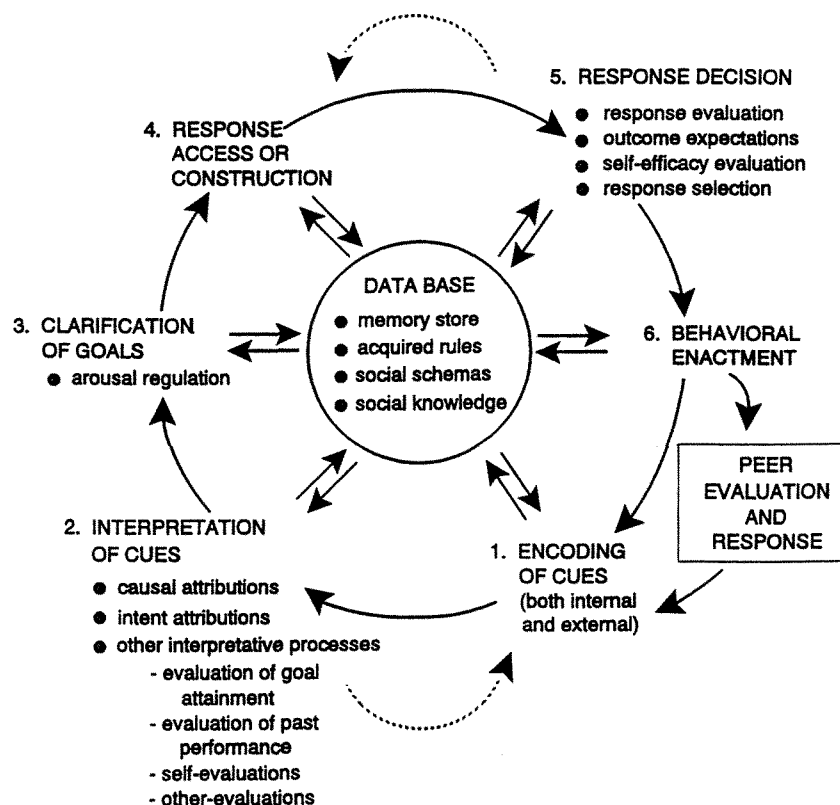


Figure 2. A reformulated social information-processing model of children's social adjustment.

A Reformulated Social Information-Processing Model of Children's Social Adjustment

A reformulated social information-processing model of children's social adjustment is depicted in Figure 2. As with previous models, it is proposed that children come to a social situation with a set of biologically limited capabilities and a database of memories of past experiences. They receive as input an array of cues. Their behavioral response is a function of processing those cues. The steps of the reformulated model include (1) encoding of external and internal cues, (2) interpretation and mental representation of those cues, (3) clarification or selection of a goal, (4) response access or construction, (5) response decision, and (6) behavioral enactment.

During Steps 1 and 2, encoding and interpretation of social cues, it is hypothesized that children selectively attend to particular situational and internal cues, encode those cues, and then interpret them. Interpretation may consist of one or more independent processes, including (a) a filtered, personalized mental representation of the situational cues that is stored into long-term memory; (b) a causal analysis of the events that have occurred in the situation (including an assessment of why the intended goal was or was not achieved); (c) inferences about the perspectives of others in the situation (including attributions of intent); (d) an assessment of whether the goal for any previous social exchange had been obtained; (e) evaluation of the accuracy of the outcome expectations and self-efficacy predictions that were made during the previous exchange with the peer

(evaluation of past performance); and (f) inferences regarding the meaning of the prior and present exchange for the self (self-evaluations) and the peer (evaluations of others). All of these interpretational processes may be influenced or guided by database information stored in memory (e.g., social schemata, scripts, and social knowledge); in addition, engagement in interpretational processes may result in subsequent changes or revisions to the database.

During Step 3, after interpreting the situation, it is proposed that children select a goal or desired outcome for the situation (e.g., staying out of trouble, getting even with a provocateur, making a friend, or obtaining a desired toy) or continue with a preexisting goal. Goals are focused arousal states that function as orientations toward producing (or wanting to produce) particular outcomes. It is proposed that children bring goal orientations or tendencies to the social situation but also revise those goals and construct new goals in response to immediate social stimuli.

Next, at Step 4, it is hypothesized that children access from memory possible responses to the situation, or, if the situation is novel, they may construct new behaviors in response to immediate social cues. These responses may or may not be triggered by the goal selected. At Step 5, it is hypothesized that children evaluate the previously accessed (or constructed) responses and select the most positively evaluated response for enactment. A number of factors are proposed to be involved in children's evaluations of responses, including the outcomes

they expect to accrue after using each response (outcome expectations), the degree of confidence they have in their ability to enact each response (self-efficacy), and their evaluation of the appropriateness of each response (response evaluation). At Step 6, the chosen response is behaviorally enacted.

Social interaction and mental processing do not stop there, of course, but ensuing events can be conceptualized as a recycling of the processing steps proposed. The specific mental mechanisms involved at each step, the theoretical assumptions of the model, and the ways in which the reformulated model differs from previous models are described in detail in the sections to follow.

The Flow of Processing

Nonlinearity of the Reformulated Model

The reformulated model of social information processing is offered as a theory of "on-line" brain performance (indeed, one advantage of this type of model over cognitive structuralist theories such as Piaget's is the more direct link to performance in real time), but its features are described at such a highly conceptual level that the translation to brain processes and neural functioning is impossibly loose. This problem has been addressed in all of cognitive science and has led to the connectionist approach to cognitive modeling (J. A. Feldman & Ballard, 1982; Hinton & Anderson, 1981). This approach is an attempt to characterize intelligent brain activity in terms of parallel numerical computational systems (neural networks) at a level that is below the language of symbols. Several limitations of most information-processing models include their sequential structure, their reliance on a symbolic system and corresponding lack of fit with neural processes (the major constructs are described in abstract language that cannot be mapped onto brain structure or process), and the linearity of their calculations (Smolensky, 1988).

The first cited problem is the apparently rigid sequential structure of the processing model (e.g., response access follows interpretation, which follows encoding). Connectionist theorists such as Rumelhart, McClelland, and the PDP Research Group (1986) have posited that processing actually occurs in simultaneous parallel paths. Undoubtedly, individuals are engaged in multiple social information-processing activities at the same time (e.g., they engage in interpretation processes while they are encoding cues, and they continue to consider the meaning of another's behavior while they access responses). It is probably more accurate to posit that, during all waking hours, individuals are perpetually engaging in each of the steps of processing proposed. So children are always encoding, interpreting, and accessing responses. Our recognition of this parallel processing is depicted in the feedback loops and cyclical structure of Figure 2. Note that this cyclical component is in sharp contrast with the more rigid linear structure of the prior model depicted in Figure 1 (adapted from Dodge, 1986).

It is also proposed in the reformulated model that, even though processing is simultaneous for each of these steps, the path from a particular stimulus (such as a single provocation by a peer) to a behavioral response (such as retaliation) logically follows a sequence of steps. So the processing of that stimulus

follows a time-related linear sequence, even though processing in general occurs simultaneously at all steps. We conclude that the parallel processing hypothesis requires one to posit feedback loops across processing steps but that the sequential portion of the proposed model has great heuristic value for understanding the processing of a single stimulus.

Second, the currently proposed symbolic paradigm, defended by Newell and Simon (1976) and Fodor (1987), is undeniably far removed from brain processes, which have been proposed to occur at a subsymbolic level. But even the connectionist approach will have problems with translation to a neural level (Smolensky, 1988). The difference between the conceptual information-processing approach and the connectionist approach can be characterized as one of different levels of analysis. The information-processing approach taken in this article has been characterized as a model of a "conscious rule interpreter," in contrast with the "intuitive processor" of the connectionist approach (Smolensky, 1988). Unfortunately, if the intuitive processor operates at a sublanguage level, it is difficult to describe these processes in language. There is a fundamental difference between the way that human brains operate and the way one can talk about these operations. But even connectionist theorists agree that this paradigm has great heuristic value. Smolensky (1988) has noted that "it is far from clear that connectionist models offer a sound basis for modeling human cognitive performance" (p. 2) and that "even under the most successful scenario for connectionist cognitive science, many of the currently practiced research strategies in cognitive science would remain visible and productive" (p. 2). Smolensky noted that the current model has its greatest applications in the study of early learning, in the application of its principles to intervention efforts, and in the culturally important exercise of organizing knowledge exchange. These are precisely the goals that have guided the current review.

The third problem with past social information-processing models is the linear algebraic computations that are suggested, with correlation and regression procedures being the data-analytic procedures used. In the reformulated model, it is proposed that the relation between processing at one step and processing at another step is probably nonlinear. Connectionist theorists (Smolensky, 1988) have noted that brain activity follows dynamical systems principles, including nonlinear transformations from one process to the next. For example, accessing of an aggressive response to provocation might occur not as a single function of the degree of peer hostility inferred by the child but by a multivariate, contingent, and nonlinear aggregation of numerous factors. So, too, behavioral responding is probably not always just a simple function of algebraic sums of componential processing steps; instead, it probably follows a more intricate path with contingent features, such as the preemptive processes described by Dodge and Somberg (1987) and Costanzo and Dix (1983). These processes might be characterized by tree diagrams, spreading activation models, curvilinear and other nonlinear functions, or other means that have been used to describe associative networks. The research guided by past social information-processing models is indeed hampered by its reliance on linear models and could benefit from these other methods of analysis. These alternative methods are recommended in future studies.

Consideration of Reciprocal Effects

In most theoretical discussions and research, the impact of social information processing on social adjustment has been emphasized. In contrast, relatively little attention has been paid to the possible role that social adjustment (peer evaluation and other social experiences) may play in the generation of children's social cognitions. The importance of this directional relation has been suggested by several investigators (e.g., Coie, 1990; Dodge & Feldman, 1990; Franke & Hymel, 1984; Ladd & Crick, 1989; Shantz, 1983); thus far, however, efforts to identify the specific cognitive processes that might be involved are lacking.

The potential advantages of examining the impact of social experiences (such as the experience of social rejection) on social information processing are numerous. First, delineation of the ways in which children's mental processes may be influenced by their interactions with others may lead to a better understanding of the ways in which previously studied aspects of social information processing develop (i.e., how children learn about themselves and others in a social context). For example, this approach would allow for an assessment of the ways in which children make links between particular behaviors and the consequences of those behaviors (i.e., an assessment of the development of children's outcome expectations). One likely possibility is that children make note of the reactions they receive from peers after they enact particular behaviors (e.g., "Hitting that kid was easy and it really worked: She gave me back the ball"). This information, if stored in memory and recalled later, may be used by the child to predict the outcomes of similar behavior in future interactions (i.e., this information may be used subsequently in Step 5 of the reformulated model).

A focus on the specific mental processes that might be influenced by peers' responses to children's behaviors may also shed light on the ways in which children's perceptions of the self develop. Many theorists have recognized the important role that social interaction may play in the development of the self-concept (e.g., Harter, 1983; Shavelson, Hubner, & Stanton, 1976; Tesser, 1984). The ways in which peers respond to a child (e.g., with aversion, affection, or neglect) and the ways in which the child thinks about those responses may be important factors in determining a child's social self-perceptions. Conversely, these self-perceptions may influence her or his social adjustment by affecting the ways in which she or he subsequently behaves toward peers (i.e., the relation between self-perceptions and social adjustment is probably a reciprocal one).

Finally, an understanding of the types of social interactions that lead to problematic social information processing might help researchers and clinicians predict children's future behavior and subsequent social adjustment difficulties. In line with this perspective, Coie, Dodge, and Kupersmidt (1990) recently suggested that some socially maladjusted children may become withdrawn (i.e., develop additional social difficulties) because their negative interactions with peers lead to negative views of social interaction (i.e., social adjustment problems lead to social information-processing difficulties, which, in turn, result in further maladjustment). Although these ideas remain largely theoretical at this point, at least one study has shown that socially maladjusted children who withdraw from peers do in fact

hold relatively negative views of social interaction (i.e., they expect to be disliked by peers and to be excluded from peer activities; Crick, 1991).

Clearly, information regarding the impact of social adjustment on social information processing could contribute significantly to the understanding of children's social relationships in a number of ways. To incorporate these ideas, it is hypothesized in the reformulated model that the relation between social information processing and social adjustment is a reciprocal one. Recognition of the ongoing, transactional nature of social exchange leads to the incorporation of representations of past events (such as the causal analysis of one's own impact on others) into mental processes that are a part of the next behavior. Thus, this cyclical, transactional model can be depicted in several mental processes that function both to integrate past behaviors into memory and cognitive structures and to guide future behaviors. As discussed later, relatively little research has been conducted on reciprocal effects to date.

Latent Mental Structures Versus On-Line Processing

Once the possibility of reciprocal effects is considered, one must consider how past events (such as the experience of social rejection by others and the experience of early attachments to adult figures) influence future social information processing and behavior. In the present model, it is proposed that a mental representation of past events is stored in long-term memory. Later, this memory is integrated with other memories into a general mental structure that guides the processing of future social cues. The proposed model adopts social psychological constructs such as *schemata* and *scripts* (Shank & Abelson, 1977) and clinical psychological constructs such as *working models of relationships* (Bowlby, 1969) as examples of these latent mental structures that hypothetically guide future processing. These structures constitute the individual's *social* knowledge.

One type of structure that has been well researched is the cognitive heuristic. Research in cognitive science has demonstrated that individuals, when confronted with the overwhelming amount of stimulus information that is present in most situations, often rely on heuristics (for reviews, see Einhorn & Hogarth, 1981; Kahneman, Slovic, & Tversky, 1982; Nisbett & Ross, 1980) or schemata (see Winfrey & Goldfried, 1986, for a review) to simplify the cognitive tasks involved in processing that information. In the reformulated social information-processing model presented in Figure 2, it is hypothesized that children rely on cognitive heuristics or schemata to help them interpret the situational or internal cues experienced in social situations. These simplifying rules and cognitive structures can make processing more efficient; however, they can also result in judgment and reasoning errors (e.g., Kahneman & Tversky, 1973; Ross, Lepper, Strack, & Steinmetz, 1977). For some children, the reliance on particular types of heuristics or schemata may be partly responsible for problematic social behavior and resulting social maladjustment. For example, a recent study of heuristics used in social decision making indicates that some children base their decisions about aggression on instrumental social cues to the exclusion of cues that are more relational in nature (i.e., these children seem to ignore information about

the impact of aggressing on their relationships; Crick, 1992). Results of this study also showed that other children base their decisions about aggression on both instrumental and relational cues. If these two heuristics are used in actual peer encounters, it seems likely that they will result in very different social behaviors (with the second less likely to lead to aggressive, maladaptive responses).

The origins of cognitive heuristics are most likely past experiences. These heuristics grow out of accumulated memories of past events, just as a child's working model of attachment relationships grows out of early experience with adults (Crittendon & Ainsworth, 1989). The impact of these heuristics on future behavior is indirect. That is, it is hypothesized that heuristics, schemata, and working models have an impact on behavior by guiding future on-line processing. Thus, two types of mental processes are proposed in the reformulated model: latent mental structures and on-line processing actions. It is proposed that (a) social experiences lead to the generation of latent mental structures that are stored and carried forward over time in memory in the form of social knowledge, (b) these mental structures constitute the "database" in processing models and influence a child's on-line processing of social cues, (c) on-line processing directly influences social behavior, and (d) the child mentally represents social behavior and its outcomes and stores them in memory, and they become part of his or her general social knowledge that will influence future actions.

Speed of Processing

Automatic Versus Controlled Processing

The seemingly rational nature of the proposed social information-processing model may lead to an inaccurate view of children as consistently reflective, active thinkers who engage consciously in all social information-processing steps before behaving. The extent to which children actually think about social stimuli before enactment of behavior and the extent to which they are aware of their own cognitive processes remain important but unanswered empirical questions. We doubt that most processing is conscious or reflective. More likely, it is highly automated.

A related question is whether the structure of social information processing varies across conscious and novel circumstances versus nonconscious and highly learned circumstances. Shiffrin and Schneider (1977) articulated the structural and procedural differences between controlled and automatic processing of information. An unanswered question is whether and how these differences are associated with any differences in social information processing in controlled versus automatic processing circumstances.

It is not clear whether individual differences in patterns of processing elicited by techniques that require conscious thought (as used in most of the studies reviewed here) are similar to patterns displayed by children in automatic circumstances. One avenue of future research will be to bring techniques for assessing automatic processes (using measures such as response time and assessment of priming effects) that are common in cognitive psychology to the study of social behavior. Recent research by Rabiner, Lenhart, and Lochman (1990) il-

lustrates the potential value of these approaches for the study of social adjustment. These authors compared children's social information processing for conditions designed to elicit automatic versus reflective processing. Results showed that some socially maladjusted children (i.e., rejected, nonaggressive boys) processed information adequately under reflective circumstances but inadequately under automatic conditions. This is a potentially serious problem given that much of social information processing is hypothesized to be automatic. The reflective measures used in most of the reviewed studies would not have allowed for the identification of this processing deficit. Thus, findings reported here may underrepresent the magnitude of processing problems that are displayed by maladjusted children under circumstances of automatic responding.

Preemptive Processing

Costanzo and Dix (1983) hypothesized that, in some circumstances, qualities of the situational stimulus lead a child to engage in "preemptive" or script-based processing, which does not follow rules of formal information analysis. Rather, this processing is rapid, automatic, irrational, and probably classically conditioned. It is processing "without thinking." The domains that stimulate preemptive processing are hypothesized to be highly emotionally arousing ones, such as religion, interpersonal relationships, and matters of great value. Results of two studies are consistent with a preemptive-processing hypothesis and provide evidence that it may occur under conditions of negative emotional arousal (Dodge & Somberg, 1987) or conditions in which a hostile interpretation of a situation has been made (Crick & Dodge, 1992). In both cases, preemptive processing was associated with social maladjustment, suggesting that children who are vulnerable to this pattern may become maladjusted.

Important questions to be resolved in future research are how preemptive processing differs structurally from other types of processing; whether individual differences in processing patterns, as assessed by the studies reviewed here (i.e., in conscious, formal ways), are equivalent to the processing patterns that occur in preemptive circumstances; and what conditions give rise to one form of processing or the other.

The Role of Development

The role of development in social information processing is an issue that has not been well addressed to date. A number of factors have probably led to this limitation. Social information-processing models, such as the one presented here, have their roots in theories constructed by social psychologists (e.g., attribution theory) and cognitive psychologists (e.g., decision-making theory and information-processing theory; see Dodge & Crick, 1990, for a review), theories that also tend to lack a developmental focus. Furthermore, social information-processing models were initially formulated with the goal of understanding variations in social behavior (e.g., individual differences in aggressive behavior) as opposed to developmental goals such as predicting age-related changes in the processing of social information. Thus, the relation between social information process-

ing and development, although interesting and important, has not been the central focus of the work in this area.

A comprehensive treatment of the role of development in the social information-processing model presented here would necessitate an exhaustive theoretical analysis and review and, thus, is beyond the scope of this article. However, because of the importance of the issue and the limited discussion of the topic to date, the following is offered as an initial (albeit rudimentary) step toward the construction of a *developmental* social information-processing model. Central to any discussion of developmental issues is the consideration of "what develops." Information-processing theorists have identified two general sources of developmental change in children's processing: (a) acquisition of cognitive skills (e.g., increases in experiential knowledge, improved attentional abilities, and greater mental organizational skills) and (b) increases in capacity or speed of processing (Miller, 1989).

Acquisition of Cognitive Skills

In the social information-processing model presented here, one of the most likely cognitive skills to change with age is the child's database of social knowledge, often referred to more generally as domain-specific knowledge by information-processing theorists (e.g., Bjorklund, 1987). As they develop, children's experiences with social situations increase. As a result, children are likely to undergo changes in their social knowledge; these transformations are probably qualitative, as well as quantitative, in nature. For example, with age, children are likely to acquire new ways of responding to social situations (i.e., their strategy repertoires increase), a quantitative change. However, children are also likely to exhibit qualitative changes in strategy acquisition as they grow older. For example, with age, most children learn relatively more skillful and adaptive ways to negotiate conflicts with peers (as opposed to the more aggressive tactics that are often used by young children). Thus, with age, the qualitative nature of children's strategy repertoires is likely to change, with a larger proportion of the strategies available for access becoming more competent and less aversive in nature.

Numerous other aspects of social knowledge are also likely to undergo changes with development, including knowledge of (a) social outcomes (e.g., increases in information about the probable consequences of particular behaviors), (b) social goals (e.g., increases in awareness of available goals), (c) the intent of others (e.g., increases in knowledge of others' probable intent), (d) the causes of social events (e.g., increases in information about the probable causes of events and knowledge of the links between particular behaviors and reactions to those behaviors), and (e) the appropriateness of social behaviors (e.g., changes in the degree to which particular behaviors are assessed as "good" vs. "bad"). These proposed developmental changes are likely to occur for a number of reasons, including increased experience with the processing of social stimuli (e.g., more opportunities to observe, and store in memory, the outcomes of particular social behaviors and increased exposure to novel social situations, contexts that may elicit the construction of new social responses) and socialization by adults (e.g., increased exposure to adults' beliefs about appropriate social behavior and punish-

ment for inappropriate behavior and to direct instruction about the outcomes of particular social behaviors).

An additional social-cognitive skill that probably changes with development is attentional ability. Studies of nonsocial information processing have demonstrated that, with age, children show improvements in their ability to detect subtle features of stimuli and to attend to relevant, rather than irrelevant, features of that stimuli (e.g., Gibson & Spelke, 1983; Higgins & Turnure, 1984). These skill improvements seem likely to be demonstrated within the social domain as well and, if so, may result in (a) greater accuracy (e.g., because processing is more likely to be based on relevant, rather than irrelevant, social cues), (b) greater efficiency (e.g., because time will not be wasted processing irrelevant cues), and (c) more complexity (e.g., because subtle, as well as more obvious, social cues will be taken into account) in the processing of social information with development.

As they grow older, children are also likely to develop more efficient, skillful ways of representing, organizing, and interpreting social information and social knowledge. Studies of nonsocial information processing have shown that, over time, the structure and organization of children's knowledge change in ways that enhance processing (e.g., knowledge of familiar content domains or contexts becomes more hierarchical; Chi & Koeske, 1983). If the same age-related process is true of social information processing, children may show increased processing abilities with age in those social contexts that are most familiar to them. For example, children who have a great deal of experience initiating friendships (e.g., children who are exposed to new peer groups often) may process information within friendship contexts more quickly and skillfully than children who lack friendship experience.

Increases in Capacity or Speed of Processing

The second general source of developmental change, increases in mental capacity or speed of processing, has been difficult to assess. A number of relevant studies have been conducted by information-processing theorists (see Miller, 1989, for a review). Unfortunately, it has proved almost impossible to separate assessment of capacity and processing speed from assessment of cognitive skills that, when applied effectively, also reduce processing time (e.g., efficient use of cognitive strategies). Even so, it is possible that children develop greater social information-processing capacity with age and, as a result, show improvements in efficiency and complexity of processing.

Increased Rigidity of Processing Patterns

In contrast with the increasing sophistication and speed of processing in the growing child, an additional developmental change is likely to be increased rigidity of already-acquired processing patterns and tendencies (including both adaptive and maladaptive patterns). Most developmental theories posit a central role for early experiences in shaping the creation of latent mental structures (such as working models; Crittendon & Ainsworth, 1989), as well as the lens that a child comes to use in focusing on and attending to the social world. These early acquired mental structures and lenses, in turn, shape future pro-

cessing and social interactions. Relatively great weight is given to early experiences in socializing a child. We hypothesize that early experiences lay down neural paths (especially in the first several years of life, when synaptic pathways can be created at a more rapid rate than in later life). These paths are traversed repeatedly in subsequent social interactions so that they become well worn and automatic. After multiple trials over many years, the paths become characterized by enhanced efficiency and complexity but also, paradoxically, by rigidity and resistance to change.

An analogy can be drawn to a marble repeatedly rolling down a muddy, rocky, and slowly drying hill. The first several trials for the marble will result in several different paths being taken. Future trials, however, will probably result in the marble taking the same path as that previously taken. With repeated trials, the path will become smoother and deeper, and the marble will roll more rapidly. Whereas one consequence of repeated experiences across development is the smoothing and deepening of neural paths (and growing efficiency of performance), another consequence is the decreased likelihood of deviations from the path previously taken. Another consequence is that a crooked path (translate: maladaptive for the child) can become deep, well worn, and repeatedly traversed, even though it seems bizarre. For the growing child, these two consequences suggest how maladaptive processing and behavioral tendencies can become routinized and resistant to change efforts, whether from future experiences or concerted intervention. The result is that processing patterns and tendencies, as they are formed, come to act like personalitylike characteristics that guide behavior. These increasingly stable characteristics account for consistency in behavior across time, self-fulfilling prophecy effects, and the failure of interventions in later life (relative to interventions in early life).

What seems most clear from the preceding discussion of the role of development is that children are likely to become more expert social information processors (i.e., more efficient, organized, sophisticated, and rigid) with age and that these developmental changes are probably due to a number of sources. Because of the current lack of information regarding the relation between social information processing and development, it is recommended that this general hypothesis, as well as specific hypotheses that can be derived from it, serve as a focus of future research.

The Role of Emotion

Another relatively neglected aspect of social information processing in past models of social adjustment (e.g., Dodge, 1986) is emotion (Gottman, 1986). This is not a problem unique to processing models; rather, it is a limitation shared with much of the literature in the fields of experimental cognitive psychology and social cognition (Winfrey & Goldfried, 1986).

Some theorists have defined emotion as distinct from social information processing (Gottman, 1986; Zajonc, 1980). Others, such as Greenberg and Safran (1984), have argued for the integration of affect and cognition, a view that appears to be gaining in empirical support (Winfrey & Goldfried, 1986). According to Greenberg and Safran, the separation of thinking and feeling is actually a sign of psychopathology rather than the nor-

mal state of affairs. In keeping with this line of reasoning, it is proposed that, in the reformulated model presented here, emotions are an integral part of each social information-processing step (Dodge, 1991).

Several examples may help to illustrate the manner in which emotions and cognition are hypothesized to interact in the proposed model. At Step 1 (encoding of cues), emotional arousal (e.g., an increase in heart rate) may serve as an internal cue that must be encoded. At Step 2 (interpretation), emotions may influence the child's interpretation of a particular situation. For example, negative feelings (e.g., anger or anxiety) experienced when meeting a peer for the first time may lead to an immediate dislike of the peer. Likewise, prior-existing arousal states can alter children's accuracy in making social interpretations, such as when fatigue leads to errors. Also, the child's interpretation itself may lead to the experience of affect. For example, an interpretation of a peer's intent as hostile may lead to feelings of fear or anger.

At Step 3 (goal clarification), emotions may enhance or inhibit a child's motivation to formulate or pursue particular goals. In fact, the current model frames goal clarification as largely an arousal-regulating process. For example, feelings of anger toward a peer provocateur might serve as the impetus for a retaliatory goal, or feelings of anxiety might lead to the generation of an avoidant goal (i.e., to remove oneself from the anxiety-provoking stimulus). It is also possible for goals to influence affect. For example, the formulation of an avoidant goal might itself function to reduce anxiety (i.e., by decreasing emotional arousal).

At Step 4 (response access), accessing particular behaviors may lead to changes in a child's emotional state. For example, accessing the response "hit him in the gut" might result in feelings of relief for a child who is being victimized by a peer. Conversely, emotions may influence the types of responses that children access. For example, feelings of fear may result in a child accessing responses that involve getting help or running away. Furthermore, at Step 5 (response decision), predicted emotional reactions to one's behavior may serve as outcome expectations, and these expectations may be used to evaluate accessed responses. For example, expecting a confrontational behavior to result in an angry response from one's boss may result in a negative evaluation of that behavior, or expecting an altruistic response to make one feel good may result in a relatively positive evaluation of that behavior.

To date, most of the relevant studies of emotion have focused on the relation between social adjustment and emotion to the exclusion of social information processing (or have assessed the relation between only two of these variables at one time). For example, an important body of research has demonstrated a positive relation between children's social adjustment and their feelings of loneliness (e.g., Asher, Hymel, & Renshaw, 1984; Asher & Wheeler, 1985; Cassidy & Asher, 1992; Crick & Ladd, 1993), social anxiety (e.g., Franke & Hymel, 1984; La Greca, Dandes, Wick, Shaw, & Stone, 1988), and depression (Quiggle, Garber, Panak, & Dodge, 1992; Vosk, Forehand, Parker, & Rickard, 1982).

However, relatively little research has been conducted from an integrative perspective on social information processing and emotion. That is, few investigators have assessed the relation

between social information processing and emotion and the impact of this relation on social adjustment (Ladd & Crick, 1989). A few recent studies provide empirical evidence that this line of inquiry is a potentially fruitful one. For example, Dodge and Somberg (1987) recently showed that emotional arousal has a debilitating effect on aggressive children's interpretational accuracy (Step 2). Also, Crick and Ladd (1993) recently demonstrated that children's feelings of distress in social situations may depend on the causal attributions they make (Step 2) in those situations, a relation that also varies with social adjustment status. Clearly, it will be important for future research to consider carefully the role that emotions play in social information processing and adjustment.

Definitional and Methodological Issues

Empirical support exists for the relation between social adjustment and many of the social information-processing mechanisms described in Figure 2. Before a review of the literature relevant to each process, attention to definitional and methodological issues is warranted.

Social Adjustment

Definitions of social adjustment have varied across studies and investigators. In the present literature, however, it has generally been defined as the degree to which children get along with their peers; the degree to which they engage in adaptive, competent social behavior; and the extent to which they inhibit aversive, incompetent behavior. In the research reviewed here, three indexes of social maladjustment have commonly been used: (a) the extent to which children are accepted by their peers (typically measured with a peer sociometric, an instrument that assesses the patterns of liking and disliking among children in a particular group), (b) the degree to which children are aggressive toward peers (e.g., the extent to which children start fights, hit, push, or threaten peers), and (c) the degree to which children withdraw from peer interaction (e.g., the extent to which children play alone rather than with peers). Children who are rejected by their peers (i.e., who have low social status), who engage in aggression frequently, or who withdraw from social contacts have commonly been considered to be socially maladjusted. These particular characteristics have been of interest largely because they are predictive of serious future adjustment difficulties (see Parker & Asher, 1987, for a review), as well as concurrent difficulties (Asher & Wheeler, 1985; Crick & Ladd, 1993). In contrast to the assessment of maladjustment, social adjustment has typically been indexed by the absence of social maladjustment (e.g., low levels of aggressiveness) or, more directly, by relatively high levels of socially competent behavior (e.g., engagement in prosocial acts and competent peer group entry behaviors).

Although peer status and social behavior have both been used as indicators of children's social adjustment in the studies reviewed here, clearly they are not interchangeable indexes. For many years, researchers have hypothesized that a child's behavior toward peers may be instrumental in determining his or her peer status (e.g., Asher & Hymel, 1981; Gottman, Gonso, & Rasmussen, 1975), and evidence from studies of the initial for-

mation of status in unfamiliar groups provides empirical support for this hypothesis (Coie & Kupersmidt, 1983; Dodge, 1983). Obviously, peer status is a reaction to the child, whereas behavior is an act by the child. This distinction has important implications for examination of the social adjustment-social information processing relation in that some aspects of social information processing might be expected to lead directly to behavior, whereas other aspects might be an outcome of peer status. For example, measures of children's response generation abilities (i.e., construction of ways to behave in social situations) might be related most directly to children's behavior, whereas measures of children's self-perceptions might be linked more directly to peer status. Of course, this issue is a complex one because bidirectional effects are likely in many cases. For example, some negative self-perceptions may be caused initially by negative peer reactions (e.g., being rejected by peers); however, these perceptions may eventually affect a child's behavior as well (e.g., children with negative self-perceptions who cannot make friends may pursue negative interactions with peers to receive some form of peer attention, which, in turn, could exacerbate the peers' negative reactions). The distinction here is between those mental processes that represent on-line processing activities and those that represent latent mental structures.

Social Information-Processing Mechanisms

For purposes of the present review, social information-processing mechanisms were defined according to the reformulated model outlined in Figure 2 (detailed descriptions of each step are provided in the sections to follow). Thus, studies were considered eligible for inclusion in the review if they included an assessment of any of the processing steps or substeps described in Figure 2. We, rather than the author(s) of a particular study, determined whether or not the study met this criterion (i.e., the authors of the research to be reviewed did not necessarily describe their work in social information-processing terms).

Several approaches to the study of children's social information processing were used in the studies reviewed here, including hypothetical situation interviews and questionnaires, interviews about real social events, and self-report inventories. The most commonly used method was the hypothetical situation interview or questionnaire (e.g., Dodge, 1980; D. G. Perry, Perry, & Rasmussen, 1986; Renshaw & Asher, 1983). Use of this method involves presenting children with one or more hypothetical social situations and questions designed to elicit responses that indicate their processing patterns at various steps. Presentation of the stimuli typically involves reading the situations to subjects (sometimes accompanied by illustrations) or showing subjects a videotape of confederates acting out the situation. A variety of situation types has been examined by researchers, including peer group entry, peer provocation or conflict, friendship initiation, peer rebuff, and object acquisition. These situational stimuli have been selected because of their presumed (or empirically derived; see Dodge, McClaskey, & Feldman, 1985) relevance to social adaptation. This approach leads to highly situation-specific responses.

A second assessment method, interviews about actual events, is similar to the hypothetical method except that children are asked to respond to questions about a real social experience. In

one of the few studies to have used this method thus far (Steinberg & Dodge, 1983), children were faced with an actual provocation situation (arranged by the experimenter) and then were asked questions designed to elicit their interpretations of the situation. A third method that has been used to assess children's social information processing is the self-report inventory (e.g., Harter, 1982). This method has typically been used to assess general mental structures, such as children's self-perceptions. Use of this method involves presenting children with a series of statements that they rate according to how true each statement is for them. Factor-analytic techniques are typically used to construct meaningful scales. This approach brings psychometric soundness but lack of attention to situational differences.

The Relation Between Social Information Processing and Social Adjustment: A Review of the Literature

Steps 1 and 2: Encoding and Interpretation of Cues

It is hypothesized that during the first two steps of processing, children come to a mental representation of the social situation confronting them. More specifically, children focus on particular cues in the situation, encode those cues, and interpret them. Relevant knowledge, gained through previous experience (e.g., in the form of schemata or scripts), is recalled from memory and used as a guide for interpreting and understanding the present social situation. Interpretation of cues may also involve causal inference (e.g., attributions about the cause of a stimulus event or about the intent of a peer).

Use of Social Cues and Schemata

Schemata are memory structures that organize information in a way that facilitates comprehension (Gerrig, 1988). That is, they aid in interpretation by allowing the individual to sort information quickly as either schema consistent or inconsistent (Bem, 1984; Hastie, 1981). One advantage of schemata is that they are cognitively efficient. However, reliance on schemata can result in the disuse of social cues in the immediate context, a situation that can lead to inappropriate social responses. For example, reliance on an aggressive schema to interpret a rough-and-tumble play situation with a peer may lead a child to ignore cues that reveal that the situation calls for play fighting rather than retaliatory aggression.

Although a great deal of research has been conducted on the use of social cues and schemata within the fields of cognitive and social psychology (e.g., Bem, 1985; Nelson, 1978; Shank & Abelson, 1977), work on the relation between these constructs and children's social adjustment has been limited. Dodge and Tomlin (1987) presented children with hypothetical provocation situations together with information about the intent of the peer in each situation. Subjects were asked to infer the intent of the provocateur and to cite the reasons why they came to that conclusion. This procedure allowed for an assessment of the degree to which children relied on the information presented in the story (i.e., immediate social cues) or general mental structures from their own previous experience (i.e., schemata) to make an interpretation of intent. Results showed that aggressive children were more likely than nonaggressive peers to base their

interpretations on schemata (i.e., information that was not a part of the social stimuli presented). In addition, aggressive children were more likely than peers to base their interpretations on social cues that occurred at the end of a social interaction (i.e., a recency effect) and were less likely to recall cues that occurred at the beginning of the interaction.

A study conducted by Strassberg and Dodge (1987) indicates that some socially rejected children may use aggressive schemata to organize or "make sense" of social interaction. These authors had children watch videotapes of other children playing and asked them to explain and to interpret the ongoing action. Results showed that rejected children tended to make aggressive interpretations of the ongoing social activity more frequently than did their nonrejected peers, a finding that may reflect a greater use of aggressive schemata by socially maladjusted children or greater attention to aggressive cues in social situations. Evidence for the latter hypothesis was obtained in a study conducted by Gouze (1987), who found that, relative to peers, aggressive boys attended to aggressive social cues more than to nonaggressive cues. Also, a study conducted by Dodge and Newman (1981) provides evidence that aggressive boys, relative to their nonaggressive peers, use fewer social cues of any type when making interpretations of social situations.

The findings from these four studies suggest several hypotheses concerning socially maladjusted children's use of social cues and schemata: (a) Maladjusted children may have memory deficits that do not allow them to store or recall presented social information adequately; (b) maladjusted children may selectively attend to particular types of social cues (e.g., aggressive or aversive acts) more often than their peers; and (c) maladjusted children may have well-developed schemata for social interaction that interfere with their ability (or motivation) to process and to use immediate social cues (e.g., because they believe they already have the situation "figured out" and, therefore, do not need further information or because the schema evokes a strong emotional reaction that preempts further processing of immediate cues). Further research is needed that explores children's social memory abilities, use of social cues, and selective attention for social cues. A better understanding of these processes is important given that the interpretations made at these first steps of social information processing are likely to influence processing at all subsequent steps.

Attributions of Causality

According to Weiner and Graham (1984), causal attributions are inferences made by individuals about the reason(s) why particular social events have occurred (e.g., inferences about why a peer has taken your lucky pencil). Attribution of cause to social events allows individuals to make judgments regarding the motivations for social events, information that is needed to understand or learn about the links between actions and reactions in a social context. Causal attributions are hypothesized to aid in subsequent goal construction (cf. Weiner & Graham, 1984) and response access and selection. For example, a child might construct very different goals and responses for an interaction with a peer depending on whether the child blames him- or herself or the peer for knocking over the glass of milk that has just spilled into his or her lap.

In the reviewed research, assessment of causal attributions has typically involved the presentation of hypothetical situations with either a positive or a negative outcome. Children have been asked to consider the reason for the outcome (e.g., Why do you think this situation happened?) by spontaneously relating their beliefs or by choosing from among several presented causes. Important dimensions that have been used to describe the nature of children's attributions in the reviewed research include the locus (e.g., external vs. internal), stability (i.e., enduring vs. momentary), and controllability (i.e., controllable vs. uncontrollable) of the cause (see Weiner & Graham, 1984, for a discussion of these dimensions and their purposes). In some investigations, children's attributions have also been assigned to specific categories to examine more closely the actual content of the cited causes (e.g., luck, other's personality, or third-party intervention).

The results of the reviewed studies indicate that socially adjusted children (when peer status is used as the index of adjustment) are more likely than their peers to make attributions that may lead to positive self-evaluations (e.g., internal attributions for positive social outcomes and external attributions for negative outcomes), whereas maladjusted children are more likely to hold external attributions for positive social outcomes (Ames, Ames, & Garrison, 1977; Aydin & Markova, 1979). These types of attributions may keep rejected children from taking credit for positive outcomes that they have produced and may keep them from developing a sense of positive social efficacy or competence, even when they experience social successes.

Because the relevant findings are mixed, the nature of the attributions that rejected children tend to make for negative social outcomes cannot be determined from the reviewed studies. Some of the evidence indicates that rejected children attribute negative events to internal causes (Ames et al., 1977; Goetz & Dweck, 1980), whereas other research indicates that they blame these events on external causes (Crick & Ladd, 1993). Because negative social events (e.g., peer rebuff and being teased or ridiculed by peers) are likely to be quite salient and problematic for rejected children, it will be important to study these types of situations further in future work.

Although it has been assessed in one investigation (Quiggle et al., 1992), the evidence thus far does not provide support for a link between causal attributional styles and aggressive behavior patterns. Given the mixed findings just described for rejected children's attributions for negative events, it should be noted that the null finding obtained for aggressive children was also specific to attributions about negative events. However, in one study (Goetz & Dweck, 1980), incompetent behavior was found to be related to internal attributions for negative social outcomes. Clearly, the relation between social maladjustment and causal attributions for social failure is still uncertain. None of the reviewed studies assessed the relation between children's causal attributions and withdrawn or competent behavior patterns.

Attributions of Intent

Initially, much of the work on children's intent attributions was conducted by researchers interested in children's moral development (e.g., Costanzo, Coie, Grumet, & Farnhill, 1973;

Leon, 1980), and, thus, this work was largely focused on developmental changes in children's thinking about peers' intentions. In the past two decades, those interested in social adjustment have begun to explore the possibility that individual differences in children's social behavior may be related to differences in their intent attributions (see Dodge, 1985). Such a relation has been proposed by many theorists (e.g., Feshbach, 1970), particularly for aggressive children; that is, retaliatory aggressive behavior toward peers is hypothesized to be related to hostile attributions of a peer's intent (coined "hostile attributional bias" by Nasby, Hayden, & DePaulo, 1979). From this perspective, aggressive behavior may serve as a defense or retaliation against an act by the peer that is perceived to be intentionally harmful to the self.

Numerous studies have assessed the relation between social adjustment and intent attributions. Use of the hypothetical situation methodology to assess intent attributions has been a dominant feature of this work. Unlike the hypothetical stories typically used in the causal attribution literature, the outcomes examined in most of the following studies are negative (e.g., a peer bumps into you and you fall in the mud; see Dodge & Frame, 1982, for an exception).

Hostile attributional biases. The reviewed studies demonstrate that the relation between hostile attributional biases and children's social maladjustment is quite robust. Specifically, it has been demonstrated that the tendency to attribute hostile intent to peers applies to first- through fifth-grade rejected children (E. Feldman & Dodge, 1987), second- through eighth-grade aggressive children (Dodge, 1980; Dodge et al., 1986; Guerra & Slaby, 1989), and kindergarten through eighth-grade rejected-aggressive children (Dodge & Frame, 1982; Dodge & Tomlin, 1987; Dell Fitzgerald & Asher, 1987; Quiggle et al., 1992; Sancilio, Plumert, & Hartup, 1989; Waas, 1988). All of the samples just mentioned were obtained from normative populations in the United States. A study conducted by Aydin and Markova (1979) indicates that the relation also holds for rejected 8- to 10-year-old British children. There is also some recent evidence that this relation may be specific to children who exhibit a particular form of social maladjustment, those who engage in retaliatory or reactive aggression (Crick & Dodge, 1992; Dodge & Coie, 1987).

Several studies of intent attributions have been conducted with clinical samples. Results of these investigations demonstrate that the hostile attributional bias holds for aggressive boys in a residential treatment center (Nasby, Hayden, & DePaulo, 1979), hyperactive-aggressive children from an outpatient psychiatric clinic (Milich & Dodge, 1984) and from school-based populations (McClaskey, 1988), incarcerated adolescent boys who exhibit undersocialized conduct disorders (behavior that is similar to the reactive aggression studied by Dodge & Coie, 1987, and Crick & Dodge, 1992; Dodge, Price, Bachorowski, & Newman, 1990), and adolescent offenders incarcerated for violent acts (Slaby & Guerra, 1988).

In one of the only reviewed studies that assessed children's processing for actual situations, Steinberg and Dodge (1983) set up an ambiguous provocation situation in which it appeared that a peer had knocked down a block structure that the subject had built. As in the findings reported earlier for hypothetical provocation situations, aggressive children attributed hostile in-

tent to the peer more often than did their nonaggressive peers. Thus, the positive relation between social maladjustment and hostile attributional biases appears to hold for actual, as well as for hypothetical, situations. This finding provides evidence for the ecological validity of intent attributions.

At least two studies have failed to find a significant relation between intent attributions and children's social adjustment. In the first, conducted by Pettit, Dodge, and Brown (1988), all subjects (aggressive and nonaggressive) showed hostile attributional tendencies. All children in this study came from economically disadvantaged and stressed families (e.g., many had family members who were victims of abuse), all of whom were receiving welfare assistance. Thus, as the authors pointed out, these children may have already learned to attribute hostility to others, regardless of their behavioral style. In the second study that failed to reveal a relation between attributions and social adjustment, Keane, Brown, and Crenshaw (1990) found no significant difference between the intent attributions of popular and rejected first graders. It is possible that the failure to find a significant relation in this case (in contrast with the more than 20 studies reviewed earlier) is due to the relatively young age of the subjects, the failure to use aggression as the index of maladjustment (i.e., the index used in all but one of the previously described studies), or the use of a relatively extreme comparison group (i.e., popular children rather than children of average status). The major problem is likely to be the use of the heterogeneous rejected group as the sample. This group includes both aggressive and withdrawn children. It is not clear that hostile attributional biases should lead to nonaggressive incompetent behavior, so the inclusion of aggression in the defining characteristics of maladjusted children may be crucial.

Notwithstanding the several findings of nonsignificant effects, the relation between hostile attributional biases and children's social adjustment appears to be quite robust. A less studied question concerns the causal and temporal nature of this relation. Reciprocal effects are quite likely, but a recent study also supports the hypothesis that hostile attributional biases can temporally antecede children's social adjustment status. Dodge, Bates, and Pettit (1990) found that hostile attributional biases in a sample of 309 preschool children predicted the emergence of aggressive behavior problems (assessed by teacher ratings, peer nominations, and direct observations) 6 months later in kindergarten. Rabiner and Coie (1989) conducted an even stronger test by experimentally manipulating children's expectations regarding the intent of peers whom they were about to meet and found that these expectations contributed significantly to subsequent peer acceptance of that child (presumably, the expectations led children to act in ways that led to peer acceptance or rejection). Thus, it seems likely that hostile attributional biases antecede and causally contribute to eventual aggressive behavior patterns and peer status. Of course, the reciprocal relation might also operate.

Several studies have been conducted in which the conditions that might influence the relation between social adjustment and intent attributions have been systematically explored. These investigations have shown that socially maladjusted children (aggressive and rejected children) tend to make more hostile attributions when they feel threatened (Dodge & Somberg, 1987) or when they respond impulsively (Dodge & Newman, 1981). It

also appears that hostile attributional biases are not accounted for by the status of the provocateur; that is, rejected-aggressive children attribute hostile intent to both liked and disliked peers more often than do average children (Dell Fitzgerald & Asher, 1987). In addition, the relative hostile attribution bias of maladjusted children does not appear to hold for situations in which the provocateur is depicted as having been involved in previous conflicts with the subject child (i.e., for the presence of highly consistent information; Waas, 1988) or for provocations in which the subject is not involved (i.e., that are directed by one peer toward other peers; Dodge & Frame, 1982; Sancilio et al., 1989). In the first of these situations, both adjusted and maladjusted children attribute hostile intent; in the latter situation, neither group attributes hostile intent at a high rate.

Intention-cue detection accuracy. Several investigations have been conducted with the aim of assessing children's errors in inferring intent for hypothetical situations in which the provocation depicted was clearly benign, hostile, or accidental (as opposed to ambiguous, as in previous studies). These studies measure children's abilities to detect accurately social cues that convey information about peers' intent. Intention-cue detection deficiencies have been found for rejected or aggressive children (Dodge, Murphy, & Buchsbaum, 1984; Dodge et al., 1986; Waldman, 1988), incarcerated adolescents with undersocialized aggression problems (Dodge et al., 1989), and reactive-aggressive boys (Dodge & Coie, 1987). Evidence indicates that the apparent intention-cue detection deficits of socially maladjusted children cannot be accounted for by a general, nonsocial information-processing deficit (Waldman, 1988) or by verbal intelligence (Dodge et al., 1990).

Clearly, the reviewed studies indicate that hostile attributional biases are displayed primarily by children with acting-out or aggressive behavioral patterns. This is not surprising given that the theoretical formulations that initially led to the study of intent attributions focused exclusively on retaliatory aggressive behavior. However, it seems possible that hostile attributions could underlie other deviant behavioral patterns as well as aggressive patterns. That is, perceptions of hostile intent in peers might lead to avoidance of peers for some children rather than to retaliation through aggression. To date, only one study has been conducted of children with withdrawn behavioral patterns, and no support was found for this hypothesis (Waldman, 1988). However, results of a recent study conducted by Quiggle et al. (1992) provide evidence that some groups of deviant nonaggressive children also show a hostile attribution bias (in their study, depressed-nonaggressive children). Thus, further investigation of this construct with additional groups of nonaggressive children (e.g., those with avoidant behavioral styles) seems warranted.

One direction for future work in this area would be to initiate longitudinal studies of the utility of hostile attributional tendencies in childhood for predicting adult cognitions, criminal activity, and psychopathology. For example, clinical research with adults has shown that borderline and antisocial personality disorders are associated with paranoid views of others' intent (similar to a hostile attributional bias; J. C. Perry & Klerman, 1978). These findings suggest the possibility of a link between child reactive aggression and adult disorder (borderline or antisocial personality disorder) that may be tested through longitudinal

investigations. Hostile attributional biases might also be predictive of later health problems. In one study, Barefoot, Dodge, Peterson, Dahlstrom, and Williams (1989) found that cynical attributional styles in 25-year-old law students (assessed by specific items of the Minnesota Multiphasic Personality Inventory; Cook & Medley, 1954) significantly predicted morbidity due primarily to cardiovascular disease more than 20 years later.

Other Interpretative Processes

The discussion so far has applied to the first social exchange of an interaction (defined as an initial behavior enacted by the child, followed by a response from the peer). For ongoing exchanges, it is hypothesized that, at Steps 1 and 2, children engage in several additional interpretative processes regarding the exchange up to that moment: (a) evaluation of goal attainment, (b) evaluation of past performance, (c) self-evaluations, and (d) evaluations of others. First, children may assess whether their goal for the previous exchange was achieved (evaluation of goal achievement). This assessment may involve an interpretation of the peer's prior response and comparisons between the previous peer response and the goal(s) held by the child for the interaction. Assessment of goal attainment has not yet been investigated empirically, although it has been recognized by several theorists as essential information for "figuring out what to do next" (Bandura, 1982; Miller, 1989; Rubin & Krasnor, 1986). There are likely to be individual differences in children's evaluations of goal attainment, with different children using different "yardsticks" or different criteria to measure social success or failure (cf. Bandura, 1982). These differences may have important implications for later adjustment. For example, children who have a tendency to view social outcomes pessimistically may give up interaction attempts more quickly than children who tend to view them more positively, even when the actual outcomes do not differ for the two groups.

During Steps 1 and 2, it is hypothesized that children also evaluate the accuracy of the outcome expectations and self-efficacy predictions that they made during the previous exchange with the peer (an evaluation of past performance). For example, children may compare their predicted outcome with the outcome actually obtained. These evaluations may lead to strengthening of the initial beliefs or to the development of new beliefs (e.g., when the initial beliefs proved to be inaccurate). Thus far, these evaluation processes have not been examined empirically.

It is also hypothesized that, at this point in the processing of a social interaction, children draw conclusions about themselves (self-evaluations) and others (evaluations of others) that are stored in memory as part of the latent mental structures. For example, children may make assessments about their own social competence (i.e., perceived social competence) or draw conclusions about others (e.g., I don't like this mean person). These conclusions are likely to be based at least partly on children's attributions regarding the reasons why they have been successful or unsuccessful in the previous social exchange. For example, a child who decides that she has failed to reach her initial goal and attributes the failure to internal causes may conclude that she was not very socially adept in the situation under consideration. This one specific "piece" of information may

not, by itself, have lasting implications for the child's view of her own competence. However, repeated instances of this process, with similar outcomes (i.e., the child concludes that she is not socially competent) may lead the child to develop a sense of general social incompetence. Other conclusions regarding the self and peers (e.g., a view of oneself as aggressive and liking or disliking for a particular peer) are hypothesized to develop in a similar manner. A comparable process, in which repeated experiences related to the self eventually lead to molar views of the self (a self-schema), has been described by Epstein (1991). Individual differences may exist in the number of times a particular experience must be encountered to be incorporated into one's memory as a schema.

It is hypothesized that during these interpretative processes, when the child uses information about the peer's response to draw conclusions about himself or herself or the peer, peer status has the most potential for influencing a child's future social information processing (and subsequent social adjustment). The reason is that peer status (i.e., liking or disliking for the child) is often reflected in the peer's behavior toward the child (e.g., rejection, acceptance, annoyance, or approval). Thus, for example, perceived peer disapproval (the interpretation of the peer response) may lead to decreases in feelings of social competence. Thus far, research on perceived social competence (i.e., an indicator of a child's awareness of his or her own peer acceptance or social skillfulness) is consistent with this perspective. This work, in which a self-report instrument developed by Harter and her colleagues has been used to assess perceived competence (Harter, 1982; Harter & Pike, 1984), generally shows a positive relation between social adjustment (indexed by peer status in these studies) and perceived social competence for children who are between the ages of 8 and 14 (Kurdek & Krile, 1982; Ladd & Price, 1986; Thompson, 1981, cited in Harter, 1982). There is also some evidence to suggest that this relation is most robust for girls (Franke & Hymel, 1984) and for older children (Ladd & Price, 1986). The theoretical explanation for the gender difference is unclear. However, the age-related effect is consistent with the hypothesis that peer status leads to perceived social competence because knowledge of one's status and amount of experience with peers both increase across age.

Although perceived social competence does not appear to be related to peer status for young children (preschool through second grade; Harter & Pike, 1984), perhaps because general knowledge structures have not yet been formed, there is some evidence to suggest that perceived competence is negatively related to avoidant behavior for young children (Rubin, 1985). Furthermore, older avoidant children (defined as withdrawn and rejected) have also been shown to hold more negative self-perceptions than their peers (Boivin, Thomassin, & Alain, 1989; Hymel, Bowker, & Woody, 1992; Rubin, Chen, & Hymel, *in press*). In contrast, evidence indicates that aggressive children (often also defined as rejected) do not hold more negative self-perceptions than peers (Boivin et al., 1989; Franke & Hymel, 1984; Hymel et al., *in press*; Rubin et al., *in press*). These findings indicate that rejected children who are withdrawn view themselves in ways that match their reputation within the peer group (i.e., they see themselves as socially incompetent, and so do their peers), whereas rejected-aggressive children do not

(i.e., aggressive children view themselves as relatively competent, whereas their peers view them as incompetent).

Step 3: Clarification of Goals

After interpreting the social situation, it is hypothesized that children formulate or clarify a goal. As defined here, goals are focused arousal states that function as orientations toward producing (or wanting to produce) particular outcomes. Goals for social situations may include internal (e.g., feeling happy, regulating negative affect, or avoiding embarrassment) as well as external (e.g., being first in line at the water fountain) states or outcomes. Not every stimulus leads to a change in one's goal state; however, because humans are always in some state of arousal, it makes sense to characterize this state in terms of goal orientations (even maintaining the status quo is a goal state).

In the reformulated social information-processing model, it is hypothesized that children bring goal orientations or tendencies to the peer situation but also revise those goals and construct new goals in response to immediate social stimuli. Children's goal orientations are evoked by their interpretations of relevant internal or external cues. The sources of goal orientations are likely to include feelings (e.g., feeling angry might serve as the impetus for a retaliatory goal), temperament (e.g., Does the child tend to move toward, away from, or against others?), adult instruction (e.g., coaching and modeling; Dodge, Asher, & Parkhurst, 1989), cultural or subcultural norms (e.g., What are appropriate goals for girls, for fifth graders, or for rich kids?), and the media (e.g., television and video games). These goal orientations are hypothesized to influence subsequent response accessing and behavior, thus indirectly influencing peer reactions.

To date, children's social goals have typically been assessed with hypothetical situations or analog situations. Use of the hypothetical method has involved asking children to describe, in an open-ended fashion, why they would follow specified courses of action in a presented situation or to select a preferred goal from among several presented alternatives. Use of the analog situation has involved inferring children's game-playing goals from the choices they make in an actual game set up by the experimenter.

Research on the relation between children's social goals and social adjustment has been motivated by the hypothesis that children who tend to construct and pursue goals that are inappropriate to particular social situations are likely to become socially maladjusted (Asher & Renshaw, 1981; Dodge, Asher, & Parkhurst, 1989). In general, the reviewed studies are consistent with this hypothesis; that is, they provide evidence for a significant relation between social adjustment and the selection of social goals for children from preschool to high school age. Specifically, this research demonstrates that positive social adjustment (i.e., defined as prosocial behavior or peer popularity in these studies) is significantly related to the formulation of goals that are likely to be relationship enhancing (e.g., being helpful to peers), whereas, in contrast, social maladjustment (i.e., defined as aggressive behavior or peer rejection in these studies) is related to construction of goals that are likely to be relationship damaging (e.g., winning over others or getting even with a peer; Crick & Dodge, 1989; Renshaw & Asher, 1983; Slaby & Guerra, 1988; Taylor & Asher, 1989).

It also appears that social maladjustment is related to goals that involve wanting to be liked (Crick & Dodge, 1992) and wanting to improve social competence (Taylor & Asher, 1989). These findings indicate that maladjusted children want to be involved with peers despite their previous lack of success in these relationships. The Crick and Dodge (1992) study suggests that this longing for peer relationships may be experienced most strongly by rejected-reactive aggressive children (i.e., those who engage in impulsive, retaliatory aggression), a group that tends to view peers as mean and rejecting (Dodge & Coie, 1987). It is conceivable that the angry aggression exhibited by reactive aggressive children partly reflects a retaliatory act against peers who are seen as withholding a valued goal (social acceptance).

In the present model, social adjustment can also influence the kinds of goals that children pursue for peer interaction (i.e., reciprocal effects are possible). For example, a child who feels rejected in the peer group might formulate a goal of avoiding peers to decrease negative forms of interaction or to avoid further rejection and humiliation (cf. Coie et al., 1990). In this way, the goals that children bring to peer interaction situations may be shaped or changed through the interaction process itself. Unfortunately, the correlational nature of the reviewed studies precludes any conclusions regarding this hypothesis. Longitudinal or experimental designs are needed to test adequately the direction of the involved effect (i.e., to test whether goals influence social adjustment, or vice versa).

Thus, although preliminary conclusions can be drawn regarding the role of goals in social behavior, empirical research on goals still has a long road to travel. One direction for future research will be to map the various types of goals that children are able to formulate for particular social situations. This work is needed to determine whether or not the goal dimensions and categories that have been investigated to date are representative of the range of goals constructed by different types of children. It is hypothesized that these goal categories will be situationally specific to some degree (e.g., establishing a friendship would probably not be a goal held by children for a situation in which they were being physically attacked; however, it would probably be a goal held by many children for a situation in which they were on the playground with peers). To accomplish this task, children will need to provide responses in an open-ended manner (such as that used by Renshaw & Asher, 1982) so that the goal categories elicited are not merely those provided by the experimenter on a questionnaire. Given evidence that it is easier for maladjusted children to recognize appropriate social goals than to produce them (Renshaw & Asher, 1983), a secondary advantage of this approach is that it is more likely than questionnaire methods to detect differences between comparison groups (perhaps because it is less transparent to children).

In most of the research conducted to date, children's preferences for one particular goal in a situation have been assessed. However, Dodge, Asher, and Parkhurst (1989) recently proposed that social interaction probably requires coordinating and managing multiple goals much of the time. These authors proposed that coordination of multiple goals is particularly difficult for socially maladjusted children. Taylor and Gabriel (1989) tested one aspect of this hypothesis by asking pairs of children to participate in a computer-simulated board game in which they each had the opportunity to coordinate cooperative

and competitive goals throughout the course of the game. Results showed that socially adjusted children and socially maladjusted girls were able to coordinate these two goals (i.e., they chose cooperative goals when they were ahead in the game and competitive goals when they were behind in the game), whereas socially maladjusted boys were not (i.e., they chose competitive goals regardless of their game status). Thus, socially maladjusted boys may be unable to adapt their social goals to the demands of the situation, at least for game-playing situations.

The goal coordination approach taken by Taylor and Gabriel (1989) appears to be a viable method for enhancing the understanding of children's goal orientations. Their research assessed children's goal flexibility within one situational context (i.e., their ability to switch from one goal to another as the nature of the situation changes). Ways to extend work in this area would be to investigate whether or not children sometimes formulate more than one social goal for a particular situation simultaneously (e.g., needing help with a math problem and not wanting to appear stupid) and to assess children's abilities to achieve more than one goal at the same time (cf. Dodge, Asher, & Parkhurst, 1989).

Step 4: Response Access or Construction

After formulating a mental representation of the stimulus array and a goal for the situation, it is hypothesized that children access behavioral responses from long-term memory. Some of these responses are strategies for attaining the goal, whereas others are responses to social stimuli that are not clearly goal driven. Children's social responses consist of their ideas about how they could behave in a specified social situation (e.g., how they could resolve a conflict with a peer). Three important aspects of children's response access have been considered by researchers: (a) the number of behaviors generated in response to social stimuli (i.e., the size of the response repertoire), (b) the actual content of the responses, and (c) the order in which children access particular types of responses.

Children's social behavior repertoires have typically been assessed with hypothetical situation methods in which they describe every possible response to the situation that comes to mind (e.g., What could you do or say if this situation happened to you? What else could you do?). Response content has been assessed through judges' ratings of the responses with respect to a specified dimension (e.g., friendliness or assertiveness) or through judges' assignments of the responses to categories (e.g., compliance, avoidance, physical aggression, or compromise).

Most of the reviewed studies provide evidence for a significant relation between children's accessing or generation of social responses and their social adjustment. This relation appears to hold for children from preschool to high school age. However, as discussed later, the nature of the relation appears to vary as a function of the social adjustment index used and the type of situation.

Only one of the reviewed studies assessed the relation between the number of social responses that children access and social maladjustment as indexed by peer status. This study provides some evidence that socially rejected children access fewer behaviors in response to hypothetical stories than do peers (it should be noted that the magnitude of this difference, although

significant, was small; Pettit et al., 1988). This finding suggests that rejected children may have limited repertoires from which to select a response to a particular social situation. This limitation would not be a great problem for these children if their behavioral repertoires consisted of primarily adaptive responses. However, this does not appear to be the case.

For conflict or peer provocation situations, the evidence indicates that the responses accessed by rejected children are more avoidant, less friendly, and more aggressive than those accessed by popular peers (Asher, Renshaw, & Geraci, 1980). These types of behaviors, if used in actual peer provocation situations, are likely to result in relatively negative consequences for the child. For example, use of aggression is likely to lead to escalation of the conflict, whereas avoidance may lead to a reputation as someone who is easily pushed around. Not surprisingly, some rejected children are commonly viewed by peers as those who start fights, whereas other rejected children are viewed as those who are easily victimized (e.g., Coie, Dodge, & Coppotelli, 1982; D. G. Perry, Kusel, & Perry, 1988). In other social contexts, it appears that rejected children lack basic knowledge about how to achieve positive social goals. That is, in friendship initiation or maintenance situations and object acquisition situations, rejected children are more likely than peers to generate ineffective, irrelevant, or vague strategies for achieving a particular goal (Asher et al., 1980; Pettit et al., 1988; Rubin, Daniels-Bierness, & Hayvren, 1982). They are also more likely to suggest that adults intervene on their behalf (Asher et al., 1980), a finding that may reflect an awareness of their own social difficulties (i.e., they may know that they need assistance to achieve these particular goals). One limitation of these studies is that most did not make a distinction between neglected and rejected children.

Studies using behavior as the index of social adjustment indicate that, with one exception (Deluty, 1981), aggressive children access a fewer number of responses to social situations than do their peers (Asarnow & Callan, 1985; Dodge et al., 1986; Slaby & Guerra, 1988; Spivak, Platt, & Shure, 1976). The evidence also demonstrates that aggressive children access responses that are more aggressive and less prosocial than those accessed by peers for provocation, group entry, object acquisition, and friendship initiation situations (Asarnow & Callan, 1985; Deluty, 1981; Dodge et al., 1986; Pettit et al., 1988; Quiggle et al., 1992; Richard & Dodge, 1982). These findings provide evidence that the response repertoires of aggressive children are similarly maladaptive across a broad range of social contexts. Also, a study conducted by Richard and Dodge (1982) shows that, even when aggressive children are able to access an initial response that is competent, their subsequent responses are more aggressive than those accessed by peers. Thus, it appears that the responses available to aggressive children at the response decision step of processing (i.e., their response repertoires) include many aggressive acts.

Studies of children with avoidant behavioral styles, although limited in number, indicate that their response repertoires are also consistent with their behavioral tendencies. That is, avoidant children tend to generate responses for conflict situations that are more submissive and less aggressive than those generated by other children (Deluty, 1981; Rubin, 1982b). In addition, it appears that, similar to rejected children, young avoid-

ant children are more likely than peers to ask for adult assistance with peer problems (Rubin, 1982b).

Studies of competent behavior, also limited in number, indicate that prosocial, assertive behavior is positively related to the generation of prosocial, friendly, assertive, or relevant responses to social situations (Deluty, 1981; Dodge et al., 1986; Pettit et al., 1988). Also, there is some evidence for a positive relation between prosocial behavior and the total number of responses accessed by children (Pettit et al., 1988; Rubin, 1982a).

In sum, the reviewed research provides relatively strong support for a link between the types of responses that children generate to particular situations and the behavior that they exhibit in those situations. One potentially important issue that has not yet been addressed in this area concerns the degree to which the responses that children generate are behaviors that have been accessed from memory (perhaps in the form of a script) or are new behavioral strategies constructed in response to immediate social stimuli. This information would help delineate whether socially maladjusted children (a) need help remembering and recalling appropriate social responses (i.e., improved response access), (b) need improvements in the cognitive processes or mechanisms involved in the formulation of new social responses (i.e., problem solving), or (c) need improvements in the repertoires themselves from which responses are accessed and strategies are constructed.

Step 5: Response Decision

At some point in the response generation process, children are faced with a behavioral decision-making task; that is, they must evaluate and eventually select one of the generated responses for enactment. This decision process may occur after children have accessed all relevant responses or generated all possible strategies for the particular situation or after the accessing of each response (i.e., children may access one response, evaluate it, access another response, evaluate it, etc.). In the reformulated model, it is proposed that children, in evaluating possible responses to social situations, consider (a) the content of each generated response (response evaluation), (b) the type of outcomes likely to ensue (outcome expectations), and (c) the degree of confidence that they have in their ability to perform each response (response efficacy).

Response Evaluation

Response evaluation involves children's assessments of the quality of social behaviors with respect to a specified, evaluative dimension (e.g., friendliness or goodness; Crick & Ladd, 1990). These assessments are likely to be based on moral rules or values (e.g., a belief that hitting people is a bad thing to do or that helping people is a good thing to do). To date, studies of children's response evaluations have involved the presentation of hypothetical situations and possible hypothetical responses and evaluation by subjects (usually Likert-type ratings) of each response according to the dimension(s) of interest.

The hypothesis underlying work on response evaluation is that favorable evaluations of a response are positively related to subsequent behavioral enactment of that response. Thus, socially maladjusted children are hypothesized to engage in mal-

adaptive social behaviors partly because they evaluate maladaptive behaviors favorably. Thus far, the evidence is consistent with this hypothesis for socially maladjusted children who are rejected, aggressive, or both. That is, rejected, aggressive children evaluate aggressive responses more favorably and competent responses (e.g., prosocial or assertive) more negatively than do their better adjusted peers (Asarnow & Callan, 1985; Crick & Ladd, 1990; Deluty, 1983; Quiggle et al., 1992). There is currently no empirical support for a significant relation between the response evaluations of avoidant behavior and engagement in avoidant behaviors (Deluty, 1983). However, it is important to note that this relation was assessed in only one of the reviewed studies and, thus, firm conclusions await further research.

Outcome Expectations

Outcome expectations have been defined as children's ideas about what is likely to occur in a social interaction after the enactment of a designated social response (Crick & Ladd, 1990). The importance of outcome expectancies in understanding social behavior has long been recognized (e.g., Bandura, 1977; Goffman, 1969; Mead, 1934; Ross, 1977; Spivak et al., 1976). However, empirical investigation of this relation began only in the past two decades.

To assess outcome expectations, children have typically been presented with ways of responding in the presented situation (i.e., social responses) and asked to describe or evaluate "what would happen" if they responded in a particular way in the given situation (e.g., What would happen if you shoved a kid out of the lunch line at school?). Both open-ended and evaluative response formats have been used in these studies. Two aspects of outcome expectations have been assessed in the reviewed research: quantity (i.e., the number of possible reasonable outcomes children can generate for a specified behavior) and content.

The expectation of favorable or desired outcomes for a particular behavior (outcome content) is hypothesized to be positively related to the subsequent enactment of that behavior. Outcome expectancies can serve an excitatory or an inhibiting function depending on whether the outcomes expected for particular behaviors are positive or negative, respectively. Significant support for a relation between the content of children's outcome expectancies and their social adjustment can be found in the reviewed literature. Studies in which peer status has been used as the index of social adjustment indicate that peer rejection is related to relatively positive outcome expectations for aggression (E. Feldman & Dodge, 1987; Hart, Ladd, & Burleson, 1990), particularly verbal aggression (Crick & Ladd, 1990). There is also some evidence that neglected children view the outcomes of assertive behaviors more negatively than do peers (Crick & Ladd, 1990), a perspective that may support their tendency to engage in submissive, nonassertive types of behaviors (see Mounts & Asher, 1992, for a review).

Most of the reviewed studies of aggressive behavior indicate that favorable expectations for the outcomes of physically and verbally aggressive behavior are positively related to the display of observed (Dodge et al., 1986), peer-assessed (D. G. Perry et al., 1986; Quiggle et al., 1992), and self-reported (Deluty, 1983)

aggressive behavior. Also, the findings from one recent study indicate that this relation may be specific to a particular subgroup of aggressive children: those who are instrumentally aggressive (Crick & Dodge, 1992). However, the findings for physical aggression appear mixed thus far. For example, in one study, aggressive children actually expected more negative outcomes for physically aggressive (but not verbally aggressive) behavior than did nonaggressive peers (Crick & Dodge, 1989). Also, Crick and Ladd's (1990) study, in which an open-ended response format was used (i.e., children were allowed to generate outcomes that were salient to them), revealed that most children expected negative outcomes involving adults (e.g., punishment) to accrue after enactment of physically (but not verbally) aggressive behaviors. Further investigation of children's outcome expectations for physical aggression is needed to clarify these discrepancies, which may be partly attributable to differences in method and the content of the outcomes explored (e.g., outcomes involving peers vs. adults) in various investigations. Results of the reviewed studies also indicate that aggressive children expect less positive outcomes than peers for behaviors that are competent or prosocial in nature (Crick & Dodge, 1989; Dodge et al., 1986; Quiggle et al., 1992). Thus, outcome expectations may serve an inhibitory function in this case.

Studies of the relation between avoidant behavior and outcome expectations are limited in number, and the findings from these studies are mixed. One study of avoidant behavioral patterns has revealed a positive relation between avoidant behavior and relatively negative outcome expectations for aggressive behavior (Crick & Dodge, 1989). However, this relation was not found to be significant in a second study (Deluty, 1983).

The relation between outcome expectancies and competent social behavior is also still unclear. Dodge et al. (1986) found observed adaptive behavior to be significantly related to positive outcome expectations for competent behavior in peer group entry situations. However, in one study (Crick & Dodge, 1989), children with prosocial behavioral styles reported more favorable outcome expectations than peers for verbal aggression, withdrawn behavior, and prosocial behavior in provocation situations. Perhaps prosocial children expect that most conflictual situations will turn out well, regardless of their own type of response. Certainly, no firm conclusions can yet be made regarding the relation between outcome expectations and competent social behavior.

Some theorists have maintained that the number of outcomes that children can generate for social behaviors (outcome quantity) is positively related to degree of social adjustment (e.g., Spivak et al., 1976). In the one reviewed study that assessed this relation, Slaby and Guerra (1988) found that nonaggressive adolescents generated more outcomes in response to hypothetical provocation situations than did moderately or highly aggressive adolescents. Thus, limited support exists for a relation between outcome quantity and social adjustment, at least for adolescents.

Self-Efficacy Evaluation

The self-efficacy construct was introduced by Bandura (1977), who defined it as the degree to which individuals believe that they can successfully perform behaviors that are necessary

for achieving desired outcomes. In the present social information-processing model, it is proposed that, to select a generated response for enactment, children must first feel confident that they can produce the behavior of interest. Thus, feelings of self-efficacy are hypothesized to be one of the criteria that children use to evaluate responses before enactment (cf. McFall, 1982).

Some of the research on the relation between self-efficacy and social adjustment has been motivated by the hypothesis that children with social difficulties may not behave competently because they lack feelings of efficacy about performing the necessary, appropriate behaviors (Wheeler & Ladd, 1982). Results of two studies in which peer status has been used as the index of social maladjustment provide support for this hypothesis (Price & Ladd, 1986; Wheeler & Ladd, 1982). However, there is some evidence that, when aggressive behavior is used as the index of social maladjustment, maladjusted children feel more efficacious than peers about performing competent responses (Crick & Dodge, 1989). This finding may be due to the direct-action nature of the competent responses investigated in the Crick and Dodge research. In their study, aggressive children reported a relatively high efficacy for competent behaviors that involved walking up to a group of peers and directly asking them to play. Aggressive children may feel more comfortable with this direct, assertive style than nonaggressive children, who may use a more subtle, prosocial approach to entering groups. To address these issues, research is needed that compares aggressive and nonaggressive children's feelings of efficacy for several types of competent social responses (e.g., direct and indirect behaviors).

Other investigations of self-efficacy have been based on the hypothesis that maladjusted behavior may be related to feeling confident about performing inappropriate behaviors. Relevant studies that have used aggression as the index of social adjustment (or a combination of peer status and aggression) support this hypothesis. Specifically, these investigations demonstrate that aggressive children feel more efficacious than do their peers about performing physically and verbally aggressive behaviors (Crick & Dodge, 1989; D. G. Perry et al., 1986; Quiggle et al., 1992). There is also some evidence that these findings may be specific to a subgroup of aggressive children: those who engage in instrumental or proactive aggression (Crick & Dodge, 1992). In addition, it appears that aggressive children may lack confidence in their ability to simply walk away from provoking situations (i.e., they report less efficacy than peers for responses that involve withdrawing from provocation situations; Crick & Dodge, 1989). These findings provide support for the hypothesis that aggressive children evaluate aggressive acts in ways that are likely to support the use of aggression.

Only one of the reviewed studies used avoidant behavior as the index of social maladjustment. Results of this investigation indicate that avoidant behavior is related to a lack of confidence about performing aggressive acts (Crick & Dodge, 1989), a finding that might reflect the submissive, withdrawn nature of children with avoidant behavioral styles. Obviously, further research is needed to assess the replicability of this finding.

Response Selection

After evaluating alternative responses to a particular social situation, it is hypothesized that children next make a response

decision; that is, they select the most positively evaluated response for enactment. The selection of a response represents the end point of the response decision step of processing. The methods that have been used to assess this step of processing are similar to those that have been used to measure response access; however, there is one important difference. Studies of response access are designed to measure the repertoire of responses that children hold for a particular social situation and their access to those responses. Thus, in these studies, children are typically presented with a hypothetical situation and are asked to think of everything that they could do or say in the situation. In contrast, those who investigate the response selection step of processing are interested in children's judgments of what they would most likely do or say in the given situation. Thus, the responses that are accessed at Step 4 of the proposed model (response access) are hypothesized to serve as the "sample" from which children select one response for enactment (at Step 5).

According to the reformulated model, socially maladjusted children make response decisions that result in the attempt to enact behavior that is maladaptive. Thus far, the evidence is consistent with this hypothesis. Socially maladjusted children are more likely than peers to make response decisions that involve aggression or nonnormative behaviors and less likely to make decisions that involve friendly behaviors, regardless of whether rejection (Ladd & Oden, 1979; Pettit et al., 1988; Renshaw & Asher, 1983), aggression (Mize & Ladd, 1988; Slaby & Guerra, 1988), or a combination of the two (Waas, 1988) is used as the index of social maladjustment. This relation appears to hold for children from preschool to high school age, with one exception. A study conducted by Richard and Dodge (1982) yielded no significant difference between aggressive children and their peers for a measure of response decisions. However, this null finding might be due to the recognition method used, one that has been shown to be less effective in detecting group differences than the generation tasks used in the previously described studies (Renshaw & Asher, 1983). Another interpretation of this finding is that the response-decision deficits of aggressive children are more attributable to response accessing difficulties than to evaluation difficulties, because the generation method requires both accessing and evaluation, whereas the recognition method requires only evaluation.

Overall, the previously described findings provide support for the proposed model by showing that (a) the types of behaviors that maladjusted children evaluate more favorably than do peers are the same behaviors that they tend to select for enactment and (b) children's response decisions are predictive of the behaviors that they actually exhibit in peer interaction (Step 6 of the model).

Conclusions, Limitations of the Model, and Directions for Future Research

It appears that, at a general level, the relation proposed between social information processing and social adjustment in the model presented here (refer to Figure 2) is a significant one. As was seen in the reviewed studies, numerous tests of this relation have been conducted, the majority of which provide support for the proposed model. This is an important achievement,

particularly because this general relation was tested with (a) diverse definitions of social adjustment (e.g., aggressive, rejected, rejected-aggressive, and withdrawn), (b) varied aspects of social information processing (e.g., social schemata, intent attributions, and outcome expectations), (c) diverse measures of social adjustment and social information processing (i.e., no standard measures were used, so these assessments typically varied considerably in content across studies and, particularly, across laboratories), and (d) diverse informants to assess social adjustment (e.g., researchers, teachers, and peers). That consistent evidence for the proposed model has been found under such varied circumstances speaks well for the robustness of the processing-adjustment relation. However, although empirical support for the model is generally quite strong, much work remains. Specific limitations of the model and recommendations for further research are outlined in the following sections.

Cognitive Emphasis of the Proposed Model and Reviewed Research

In the reformulated model, we have attempted to move beyond cognitive variables to consider other factors that may also be important contributors to children's social adjustment. However, although noncognitive factors such as emotion, the relationship between self and other, and social experience have been added to the model, cognitions have still been assigned a primary organizing role. As with any theoretical model, it is important to recognize the limitations of the approach we have taken. One of the most obvious limitations is that the impact of noncognitive factors on children's social adjustment tends to be viewed through a cognitive lens. That is, the role of these factors in influencing (or being influenced by) social information processing is emphasized here, rather than direct links from noncognitive factors to social adjustment. Thus, our theoretical approach is unlikely to generate research in which noncognitive factors (e.g., emotion) are viewed as the driving force in children's social adjustment or in which the relation between noncognitive factors and social adjustment is studied independently of social information-processing factors.

A related limitation concerns the cognitive emphasis of methods that have been used to test the presented model. With few exceptions (e.g., Steinberg & Dodge, 1983), authors of the reviewed research have used hypothetical situation methodologies to assess children's social information processing, methods that are likely to involve active, reflective thinking. As a result, empirical support for the model is based primarily on data from procedures that emphasize the information-processing aspects of social interaction. There is a need for future research in which alternative methods are used that allow for more ecologically valid assessments of social information processing (e.g., through the study of actual social interactions) and that allow for a more stringent test of the role played by active processing versus other hypothesized factors (e.g., preemptive processing and emotion) in children's social adjustment.

Generalizability of the Proposed Model

In most of the studies reviewed, aggression was used as the index of social adjustment (we include here the many studies in

which rejection was the index used but results were attributed to the aggressiveness of the rejected group). Consequently, the strongest support for the proposed model concerns the relation between aggression and social information processing. In contrast, relatively less is known about the applicability of the proposed model for other important aspects of social behavior, including avoidant behavior (e.g., submission and withdrawal) and competent behavior (e.g., prosocial acts and socially skillful behavior). It will be important to initiate additional research in this area to test thoroughly the generalizability of the proposed model.

Factors That May Moderate the Relation Between Social Information Processing and Social Adjustment

Gender

Research on gender differences in personality and behavior indicates quite strongly that girls are more interpersonally oriented (e.g., more prosocial or cooperative and more concerned about social disapproval) than boys, who appear to be more instrumentally oriented (e.g., more concerned about controlling external events, more physically aggressive, and more dominating toward peers; Anastasi, 1984; Block, 1983). Moreover, recent research has revealed gender differences in the forms of aggression that some socially maladjusted children exhibit. Specifically, whereas boys tend to engage in overtly aggressive behaviors such as hitting or verbal abuse (Block, 1983; Parke & Slaby, 1983), the aggression exhibited by girls tends to be more indirect and focused on harming peer relationships (Cairns, Cairns, Neckerman, Ferguson, & Garipey, 1989; Crick & Grotpeter, in press; Lagerspetz, Bjorkqvist, & Peltonen, 1988). The social information-processing model offers one hypothesis for how these gender differences in behavior might occur (i.e., they may be due to associated gender differences in processing patterns).

Thus far, relatively little research has addressed adequately the relations among gender, social information processing, and social adjustment. This limitation is probably due to a number of reasons. First, the socially maladjusted groups targeted in the reviewed research were often small in number, a circumstance that makes gender differences difficult to assess. In many studies, gender was simply not included as a factor or, if it was included, low power made it difficult to detect Gender \times Adjustment Group interaction effects. Second, the socially maladjusted group most often targeted in the reviewed research (i.e., overtly aggressive children) is typically composed primarily of boys (i.e., because boys are significantly more overtly aggressive than girls), and, therefore, the extent to which the results of these studies generalize to girls is unclear. Thus, empirical support for the role of gender in the present model is currently lacking.

We propose that gender moderates the relation between social information processing and social adjustment in two ways. First, it is hypothesized that, for the majority of socially maladjusted children, maladaptive social behavior will be associated with social information-processing patterns that are relatively extreme but gender normative in nature. Specifically, it is proposed that social maladjustment will be associated with inter-

personally related cognitions for girls and instrumentally related cognitions for boys. This hypothesis assumes that socially maladjusted children are acting or thinking "appropriately" for their gender except that, obviously, they are doing so in such an extreme manner that they are considered deviant (e.g., a boy who is so concerned with dominating others that he uses aggression to accomplish this instrumental goal). The reviewed research provides initial support for this hypothesis. In those studies that assessed the relations among gender, social information processing, and social adjustment, significant differences in the processing patterns of adjusted and maladjusted boys were found for generation of aggressive responses and for outcome expectations for assertive behaviors (Crick & Ladd, 1990; Rubin, 1982a), cognitions that reflect instrumental concerns. In contrast, differences between socially adjusted and maladjusted girls were found primarily for perceived social competence (Franke & Hymel, 1984), which involves cognitions that reflect relational concerns.

Our second hypothesis regarding the impact of gender on social information processing and social adjustment concerns socially maladjusted children who exhibit behavior that is non-normative for their gender (e.g., physically aggressive girls). Children who engage in this type of behavior probably represent a small proportion of socially maladjusted children. However, although relatively few in number, they probably experience the most significant adjustment difficulties. Gender-atypical behavior is likely to incur more negative social consequences than behavior that is relatively extreme in frequency or intensity but gender consistent (i.e., the type of behavior discussed in the first hypothesis). Thus, our second hypothesis is that, for both sexes, social maladjustment that is gender atypical will be associated with social information-processing patterns that are particularly deviant relative to those of same-sex, socially adjusted peers.

Age

On the basis of the reviewed research, it appears that studies of the relation between social information processing and social adjustment have not been equally distributed across all age groups. Rather, the majority of previous studies have included children of grade school age (i.e., particularly those aged 9 to 12 years) as subjects. By contrast, less is known regarding the social information processing-social adjustment relation for young children (i.e., preschool through second grade). The relative lack of research with this age group may be at least partly due to assessment difficulties encountered with young children. That is, social adjustment and social information-processing measures, although reliable and valid with these age groups in many instances (Asher & Hymel, 1981; Mize & Ladd, 1988), take significantly more time to administer to younger children and often require relatively costly methods (e.g., individual interviews rather than group assessment and use of puppets or pictures, rather than written questionnaires, to elicit responses). Similar to children in the young age groups, adolescents have also been understudied. Assessment of social adjustment in older children poses unique challenges because maladaptive social behavior (e.g., aggression) often becomes more subtle during adolescence (making it more difficult for researchers and

other informants to observe); also, because children's social groups enlarge significantly during this period, the relevant peer group (i.e., to be used for assessments of peer acceptance) becomes difficult to define. Despite the difficulties inherent in the assessment of social adjustment and social information processing at some ages, it will be important to more thoroughly address the role of development in the relation between these two factors in future research. In particular, longitudinal research is needed that tracks the changes that occur in the processing-adjustment relation over time.

It appears that age may affect social information processing and social adjustment in a number of ways. First, development may affect social adjustment (i.e., the nature of children's social adjustment difficulties may change as they grow older). For example, research has shown that, on average, children become less physically aggressive with age, and this change is typically accompanied by a rise in verbal aggression (for reviews, see Block, 1983; Parke & Slaby, 1983). Second, development may affect social information processing. That is, maturation may lead to increased cognitive capacities that are likely to influence children's social information-processing performance (e.g., the basis for children's intent judgments becomes less concrete with age; see Miller, 1989). Several investigators have proposed that the social information-processing abilities of socially maladjusted children lag developmentally behind those of their adjusted peers (Garber, 1984; Sroufe & Rutter, 1984). If so, maladjusted children would be expected to hold social cognitions that are more similar to those of younger children than to those of same-age peers. Evidence from several studies (all with cross-sectional designs) provides support for this view (Crick & Ladd, 1990; Dodge et al., 1984; Dodge & Newman, 1981; E. Feldman & Dodge, 1987). However, longitudinal investigations are needed to test more adequately the developmental-lag hypothesis.

These findings provide evidence that age affects both social information processing and social adjustment. However, another question of interest is how age might affect the relation between social information processing and social adjustment. One simple way is for age to influence the strength (or magnitude) of the relation between social information processing and social adjustment (cf. Dodge & Feldman, 1990). For example, evidence indicates that perceived social competence and peer status are unrelated for preschool through second-grade children (Harter & Pike, 1984), positively related for third-grade children (Kurdek & Krile, 1982; Ladd & Price, 1986), and even more strongly positively related for fifth-grade children (Ladd & Price, 1986).

When age affects the magnitude of the relation between social information processing and social adjustment, it may reflect difficulties in assessment for children at some ages but not for others. It is also likely that some aspects of social information processing affect social adjustment at some ages but not others. For example, Piaget (1965) suggested that perspective-taking skills and empathy will be relevant to social behavioral outcomes during the concrete operational period (ages 6 through 8) when these skills are being acquired but not before this period (when few children display these skills). Consistent with this hypothesis, Rubin (1972) found that referential communication skills (requiring perspective taking) correlated positively

with popularity among kindergarten and second-grade groups but not among fourth and sixth graders.

Just as relevant skills vary with age, relevant social tasks and situations also vary across development (Higgins and Parsons, 1983). Ruble (1983) has found that social comparison processes are not relevant to children in preschool but become relevant when children enter the competitive setting of elementary school. Rubin and Krasnor (1986) noted that relevant tasks for toddlers include proximity seeking and attention getting, whereas friendship initiation and information exchange are relevant for elementary school children. Heterosexual relationships do not become relevant for many children until adolescence. It is hypothesized that social information-processing mechanisms will relate most strongly to social adjustment in those tasks that are relevant for a particular age group.

Social Context

Dodge and colleagues have argued for a situationally specific approach to the assessment of social information processing (e.g., Dodge & Feldman, 1990; Dodge et al., 1986; cf. Goldfried & D'Zurilla, 1969). These authors have proposed that some aspects of maladaptive social information processing may be specific to particular situations for particular groups of children (see Dodge et al., 1986, for empirical evidence that supports this idea). In the reviewed studies, the degree of situational specificity used appears to vary, largely as a function of the social information-processing mechanism being considered. In general, studies of children's social goals, response access, response evaluation, outcome expectations, intent attributions, and self-efficacy have considered situational specificity to the greatest degree thus far. These are all aspects of processing that logically influence behavior and peer reactions (rather than being reactions to peer status). In investigations of these components, situations have typically been defined by a specified goal of the peer interaction (e.g., making friends) or by a prototypical, common peer behavior (e.g., peer provocation). Social information-processing differences between socially maladjusted children and their peers have been most prominent in those situations that are highly relevant to social success (Dodge & Feldman, 1990). These situations include initiation of relationships (e.g., peer group entry) and resolution of peer conflicts (e.g., provocation), contexts that have received the majority of research attention in the reviewed studies.

At a moderate level of situational specificity are studies of children's causal attributions in which situations have been commonly categorized as either positive (e.g., some kids in your class want you to be on their soccer team) or negative (e.g., your best friend doesn't invite you to her birthday party). At the lowest level of situational specificity are studies of children's self-evaluations (e.g., perceived social competence). These aspects of social information processing are reactions to peers' acceptance or rejection of a child, and their influence on the child's behavior is indirect. In these investigations, relatively little information is typically given to subjects regarding social context. In comparison with the measures discussed earlier, these measures rely more on children's ability to recall relevant past experiences from memory and to combine these experiences in some manner to make an overall judgment (e.g., Do I feel dis-

liked by peers most of the time?). Thus, it is not clear whether the generalizability of responses across situations is due to children's natural summation across stimuli or whether it is due to constraints imposed by the experimenter. Furthermore, it is not clear whether children's latent mental structures are organized with situational constraints or whether they are organized at a more global level. Clearly, additional work is needed to determine whether socially maladjusted children's self-perceptions hold across all social contexts (and are indeed pervasive feelings and perceptions).

The possible impact of characteristics of the target peer on the relation between social adjustment and social information processing has not been considered in most of the reviewed studies. Typically, the characteristics of the target, hypothetical peer in these studies have been described in general terms (e.g., "a kid in your class"), if at all, and have not been examined systematically. To date, the few studies that have investigated target effects have found primarily main effects for target but no significant interactions with social adjustment indexes (e.g., Dell Fitzgerald & Asher, 1987; Dodge, 1980; Dodge & Frame, 1982; Waas, 1988). Thus, there is limited evidence to suggest that, in general, social information processing does depend on the characteristics of the target. However, it is not yet clear the degree to which target information modifies the understanding of individual differences in the relation between social information processing and social adjustment.

Future work in this area seems warranted, one direction for which is suggested by recent work on peer victimization. A number of studies indicate that a relatively small percentage of children within a peer group tend to serve repeatedly as the targets of socially maladjusted behavior such as aggression (e.g., Crick & Grotpeter, 1993; Olweus, 1984; D. G. Perry et al., 1988). From the perspective of the proposed model, one possible explanation for this finding is that socially maladjusted children process information about their victims differently than they process information about their nonvictims (i.e., in ways that promote their use of aggression toward victims only). Systematic comparison of children's processing of information about victimized versus nonvictimized children may shed light on aspects of interactions with social victims (if any) that aggressive children interpret as provoking. Furthermore, it may provide more general information about the impact of target characteristics on the relation between social information processing and social adjustment.

Statistical, Methodological, and Design Issues

Magnitude of the Reviewed Findings

Many investigators of the relation between social information processing and social adjustment have been impressed by the weak magnitude of research findings and the similarity in the cognitions of children who vary in degree of social adjustment (e.g., Gottman et al., 1975; Ladd & Oden, 1979; Renshaw & Asher, 1982). For example, in their study of children's social responses, Renshaw and Asher (1983) found a 70% overlap in the behaviors suggested by popular and by unpopular children. Examination of statistical indices of the strength of the relation

between social information processing and social adjustment (r^2 or η^2), reveals that, of the social cognitions assessed in the reviewed studies, few have accounted for a very large percentage of the variation in social adjustment.

These findings are undoubtedly open to multiple interpretations, and, thus, they raise such questions as (a) Why do social information-processing variables not account for more variation in social adjustment? (b) How much variation accounted for is enough? and (c) Is "amount of variation accounted for" an appropriate index of importance in the first place? To address these questions, it is necessary to evaluate the magnitude of the theoretical as well as the observed relation between social information processing and social adjustment.

At the theoretical level, a comprehensive evaluation of processing variables should account for 100% of the variance within a single event because processing actions are the hypothesized mechanisms for behavior. When events are summed across time or contexts, the magnitude of the relation should decrease to the degree that the summation occurs across heterogeneous contexts. It is important to note that no study to date has considered all of the relevant processing variables posited by the model, so this test has never been conducted.

A modest relation between one aspect of social information processing and social adjustment is what is predicted by the model. Theoretically, because social information-processing models posit multiple causes of behavior, it is inconsistent with the theory to expect one, or even several, social information-processing variables to account for most of the variation in social behavior. In line with this hypothesis, previous work has shown that the use of several processing predictors aggregated by multiple regression often leads to greater prediction than methods that use a single predictor (Dodge et al., 1986; Slaby & Guerra, 1988). These studies have been able to account for more than 50% of the variance in behavioral and adjustment outcomes.

Also, multiple predictors may still yield only a moderate relation between social information processing and social adjustment because of the many behaviors that adjusted and maladjusted children have in common. That is, because socially adjusted and maladjusted children engage in many of the same behaviors much of the time (e.g., children labeled as "aggressive" do not engage in aggressive acts in many of their peer interactions), one would expect them to share common social cognitions in many instances. In fact, children who process social information in completely nonnormative ways are likely to have more severe problems (e.g., mental retardation or psychotic thinking) than are typically indexed by social adjustment measures. Also, because of the attempt to measure processes that occur repeatedly over time in the real world, a single-trial study may significantly underestimate the actual amount of variation in social adjustment accounted for by social information processing. Abelson (1985) argued that, for studies of this type, researchers should not necessarily be discouraged by observed r^2 or η^2 values that are low or even minuscule in magnitude because the effects of the explanatory variable (social cognitions in this case) may cumulate over time. An analogy can be made to baseball batting averages, in which the difference between a superstar and an average player may be seen in only 1 in 20 at-

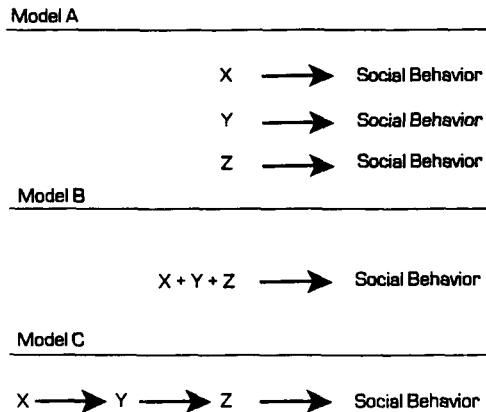


Figure 3. Possible models of multivariate antecedents of social adjustment.

bats (batting averages of .300 vs. .250). This small variation can add up to huge differences in other respects (such as salary).

Several reasons could be given for why the observed relation is not higher. One plausible explanation is that measurement errors in the assessment of both indexes (social information processing and social adjustment) reduce the magnitude of the observed relation between the indexes. For example, some children may respond to social information-processing measures in socially desirable or defensive ways that do not reveal their "true" thoughts. Errors in the identification of comparison groups (e.g., rejected-aggressive or neglected) may also reduce the magnitude of the observed relation between the indexes. For example, research has shown that classification errors occur in the identification of social status groups when fewer than 100% of the children in a particular peer group take part in sociometric status assessments (Crick & Ladd, 1989).

In sum, it will be important for future researchers to continue to make improvements in methods used to assess social information processing and social adjustment. However, it will also be important to consider and make more explicit the theoretical expected magnitude of the relation between a particular processing mechanism and social adjustment.

Statistical Tools Used to Evaluate the Social Information Processing–Social Adjustment Relation

In Figure 3, three models are depicted that each describe a way in which the relation between social information processing (e.g., X , Y , and Z) and social behavior may be conceptualized, assessed, and statistically tested. In Model A, social information-processing variables X , Y , and Z are assumed to be independent of each other and to be independently predictive of social behavior. This model describes research in which one aspect of social information processing is assessed and related to social behavior through analysis of variance or simple regression. Model A characterizes the manner in which most of the reviewed research has been conducted (although its assumptions were not necessarily intended by the authors).

In Model B, processing variables X , Y , and Z are not assumed to be independent of each other, but all three are assumed to be

predictive of social behavior. This model describes research in which several aspects of social information processing are assessed in the same study and then related to social behavior with multiple regression (or a similar statistical tool; e.g., Dodge et al., 1986). The regression model takes into account the dependency among the processing mechanisms and assesses the relation between social behavior and a linear combination of X , Y , and Z . This model is likely to provide better overall prediction of behavior than Model A because of the greater number of predictors involved. One limitation of Model B is that it may not generate research that explores the ways in which X , Y , and Z work together to "produce" social behavior. It also does not distinguish between variables that are directly related to behavior (i.e., processing variables) and variables that are indirectly related to behavior (i.e., latent mental structures).

Model C emphasizes the linkages among the social information processes. In this model, it is assumed that processing mechanism X is most predictive of processing mechanism Y , Y is most predictive of Z , and Z is most predictive of social behavior (although X and Y are also predictive of behavior to some degree). This model takes into account the hypothesized temporal nature of the proposed social information processes (e.g., X must occur before Y and thus must influence Y more than it influences later steps in the model). This model also enables one to test the relation between latent mental structures and processing variables. Use of this model might require more complex statistical tools (e.g., structural equations or probabilistic sequential analyses) than have been used previously to study social information processing. It is important to note that this model depicts processing of a single stimulus only. As discussed previously, the reformulated model posits that processing of a single stimulus follows a time-related linear sequence, even though processing in general occurs simultaneously at all steps. Model C is proposed as a useful heuristic for understanding processing of a single stimulus. In contrast, assessment of general, parallel processing would require the addition of feedback loops to Model C and consideration of nonlinear associations.

Models A, B, and C may be thought of historically in the evolution of research and theory on the relation between children's social information processing and their social adjustment. Model A describes early conceptualizations. Use of this model has often focused attention on one variable at a time, and in the process it has encouraged the development of reliable and valid assessment techniques for each variable. Model B depicts a revision of the early model. Use of this revised model has been limited to date, but it has the potential to help in identifying the particular sets of cognitive variables that are most useful in understanding social behavior. In Model C, a "second wave" reformulation is proposed (many others are certainly possible). This model may help in describing more specifically the mental processes in which children engage when confronted with a social situation by raising such questions as (a) How do the individual social information processes influence each other? (b) In what sequence do children proceed through the proposed processes? and (c) Is a particular social information process more important for predicting the next step in the sequence than for predicting social behavior?

The Need for Causal Research Designs

It is important to note that, with few exceptions (e.g., Dodge et al., 1990; Rabiner & Coie, 1989), the reviewed studies were cross sectional and correlational in nature and, thus, few conclusions can be drawn regarding causality in the proposed model. In future research, more complex research designs are needed to assess the impact of social adjustment on children's social information processing and the impact of social information processing on children's social adjustment.

Previous research indicates that degree of social adjustment changes over time for some children. For example, a recent longitudinal study has shown that, although rejection is a stable condition for groups of children, large numbers of individuals (at least 50%) become better liked by peers within a 1-year period without outside intervention. Also, on average, children become less aggressive with advancing age (Block, 1983; Parke & Slaby, 1983). Longitudinal investigations are needed that examine whether improvements in social adjustment that occur naturally or in the context of intervention are associated with favorable changes in children's social information processing.

Research with experimental designs and longitudinal investigations are also needed to test whether improvements in social information processing (e.g., increases in internal attributions for social success) lead to improvements in social adjustment. This type of research, although complex and difficult to implement, is needed to test empirically the second pathway of the hypothesized causal nature of the social information processing-social adjustment relation. A few short-term investigations of this type have been conducted in the context of social skill training efforts (e.g., Bierman, 1986; Bierman & Furman, 1984; Guerra & Slaby, 1990; Ladd, 1981; Mize & Ladd, 1990; Oden & Asher, 1977). These studies provide initial support for the hypothesis that improvements in social information processing lead to improvements in social adjustment. However, to determine whether processing changes have lasting effects on children's social adjustment, investigations are needed that follow children for longer periods of time than in prior work.

The Need for Studies of Cognitive Process

To test some of the hypotheses that are fundamental to social information-processing theories, future research is needed that assesses cognitive processes. Although the word *process* is often used indiscriminately to refer to many types of cognitive constructs, a useful distinction can be made between cognitive processes (how children think) and cognitive outputs (what children think). The reviewed research has focused on the study of cognitive outputs and has neglected the study of cognitive processes or "mental actions." For example, previous work has provided a description of the types of outcomes that children expect to accrue for a variety of social behaviors and a description of the types of social behaviors they tend to select for enactment (both examples of what children think). Social information-processing theory proposes that children use outcome expectations to evaluate social behaviors and to make behavior decisions. Research has not yet tested this hypothesis, nor has it evaluated how children process multiple outcome expectations (e.g., expected instrumental outcomes and expected relation-

ship outcomes) to make an overall evaluation of a behavior. To address these types of issues, a process approach is needed that attempts to map the mental actions in which children engage when interpreting and evaluating social information. Such an approach may require different methods and statistical analyses than those used in the reviewed research.

One body of work that may be useful in the study of social information processes is information integration theory. Integration theory is a general theory of decision making developed by Anderson (1974, 1981, 1982). According to this theory, children (and adults) make judgments by evaluating each piece of stimulus information and then integrating the individual pieces into a unitary response. Methods developed by Anderson (1982) allow for the assessment of cognitive processes, and tests of mathematical integration models provide a specific description of the nature of these processes. As a further illustration, information integration theory could be applied to the example given previously to assess whether or not children use outcome expectations (i.e., the stimulus information) to select behaviors for enactment (i.e., social behavioral decisions). Tests of mathematical models (functional equations) could be used to determine how children combine multiple outcome expectations to reach a final decision. For example, children may consider the positiveness of all possible outcome expectations for a particular behavior and then "average over" this information to evaluate the overall desirability of each behavior. Or children may simply rely on one type of outcome and ignore others when making a behavioral decision. Tests of these types of hypotheses that involve cognitive processes have potential for significantly advancing social information-processing theory and knowledge of children's social adjustment.

The Need for Improved Classification of Target Groups

To date, analyses of the data obtained from social information-processing measures have largely been conducted at the group level. Recently, the average size of these groups has decreased as researchers have moved away from general classifications (e.g., unpopular) and toward more specific classifications (e.g., rejected and proactive aggressive). Specific classifications are often theoretically more interesting than general classifications, and they yield more homogeneous groups. However, they also have the possible disadvantage of generating a great deal of knowledge about relatively few children and relatively little knowledge about most children (e.g., in a sample of 1,200 children, only 15 are likely to be classified as rejected or proactive aggressive). This risk is more troublesome if one questions whether or not the specific groups currently being studied are indeed among those most in need of attention.

To address this issue, it seems important for future researchers to pursue two different but related research objectives. The first objective is to study the relation between social information processing and social behavior from a normative, developmental perspective. This approach would ensure that knowledge is not limited to a relatively small percentage of the child population. The second objective is to study the relation between social information processing and social behavior for deviant groups of children. This objective is best addressed by the study of theoretically important, specific groups of children (e.g., rejected

and proactive aggressive). The second objective may also be advanced through information gained from the study of the first objective. For example, findings from a few studies that have included age as well as social adjustment status as independent variables indicate that the social information-processing patterns of deviant children resemble those of younger children in some instances (e.g., Crick & Ladd, 1990; Feldman & Dodge, 1987). Thus far, the evidence for a developmental-lag theory of social deviancy (i.e., that the social development of maladjusted children lags behind that of their peers) is inconclusive; however, this research illustrates how combining the two proposed objectives may enhance the understanding of social adjustment and social maladjustment.

Concluding Comments

The sequential social information-processing model presented here has proven to be a useful heuristic for organizing the empirical literature on the relation between social information-processing variables and children's social adaptation level. The correlational nature of most research designs prohibits clear conclusions regarding the causal direction of these relations, but it appears that some aspects of processing (such as hostile attributional biases, intention-cue detection accuracy, response accessing patterns, and evaluations of response outcomes) are likely to be causal of social behaviors that lead to peer status outcomes, whereas other aspects (such as self-perceptions) are likely to be responsive to peer status. Experimental intervention designs and longitudinal analyses with large samples and sophisticated data-analytic techniques will be required to answer these questions with greater confidence. Future efforts should be directed here, as well as in continually updating models of human performance.

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Call for Papers on Change Process Research

The *Journal of Consulting and Clinical Psychology* is inviting submissions for a special section devoted to the exploration of new methods to study critical change processes in psychotherapy. Especially encouraged are papers that develop or apply empirical and statistical methods to the problems of specific, moment-to-moment changes. Also encouraged are papers that focus on identifying critical events across therapy sessions, measuring verbal and nonverbal change processes, relating in-session changes to other processes, session changes, and treatment outcomes, and those that work to identify how people change in psychotherapy. Studies on theoretically relevant constructs are particularly welcome. For example, methods that allow investigation of the creation of meaning, resolution of unfinished business, alliance ruptures, insight and cognitive restructuring events, as well as those that focus on group, systemic, and couples' interventions and problems, are welcome. Theoretical and descriptive papers should include examples of the application of the methodology in research and should be presented in a nontechnical way for broad consumption. The editors of this special section are Leslie Greenberg and Frederick L. Newman. Outlines and proposals should be submitted with a cover letter identifying the submission as being in response to the call for papers on change process research. Authors should submit proposals and outlines of articles by May 1, 1994, to Larry E. Beutler, Editor, JCCP, Graduate School of Education, University of California at Santa Barbara, Santa Barbara, California 93106-9490 (electronic mail address: beutler@edstar.gse.ucsb.edu).